COMMUNITY RELATIONSHIPS WITH TRADITIONAL FORESTS AND THEIR EFFECTS ON LONG-TERM CONSERVATION: A CASE STUDY FROM KABOLI, TOGO

By

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Abstract

Despite Togo's status as a low forest cover country, remnant forest patches play an important role in conserving biodiversity and ensuring the well-being of the country's human population. Most of these remnant forest patches are communal lands managed by local family groups, and many are sacred forests, or forests that have been protected due to their role in local religious systems. In recent years, these unique social-ecological systems have been threatened due to the degradation of traditional religion.

In three manuscripts, this thesis presents a case study focusing on the social and ecological role of four community forests in and around Kaboli, Togo. The first manuscript compares the ecological value and level of degradation of sacred forests and other community forests based on measurements of tree cover within historic forest boundaries, vegetation composition, biodiversity, and biomass. The second uses focus group interviews to gain an understanding of the social and cultural factors contributing to forest degradation and conservation. Finally, the third manuscript focuses on the effects of westernization on relationships between forests and people in Kaboli.

Factors identified as contributing to forest degradation include rapid population growth, overly restrictive government policies, poverty, local land use conflicts, and westernization. Early western influences during the years of the slave trade contributed to the formation of relationships between forests and people in Kaboli while later effects of conservation and development efforts (including religious, political, and economic changes) eroded traditional respect for sacred forests.

Communities most successful in conserving their forests are those that have sacred sites within their forests and whose cultural connections to their forests are strongest. The evidence for this is that forests containing sacred sites were significantly less degraded than otherwise similar community forests that did not contain a sacred site, with a species composition more typical of endangered dry forest ecosystems, and higher tree cover, biomass and biodiversity. Communities whose forests contained sacred sites also identified more social and cultural values of community forests than those that did not. Thus, maintaining the traditional cultural connections to these forests might be the most effective way to conserve them.

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Chapter 1. Introduction

Togo is a country with a naturally low forest cover due to its location in the Dahomey corridor, a break in the West African tropical forest resulting from dry winds originating in the Sahara Desert (Sayer et al. 1992). In recent years, high rates of deforestation have led to the near eradication of certain already rare forest types within the country. For example, dry forests in northern and central Togo have nearly disappeared (Kokou et al. 2008). According to the United Nations Food and Agriculture Organization (FAO), Togo has one of the highest rates of deforestation in the world and lost an average of 5 percent of its forest cover each year between 1990 and 2015 (FAO 2015). The FAO reports that in 2015 only 188,000 hectares of land, or 3.3 percent of the country's surface area was forested (Sama et al. 2015). Forest loss in Togo is particularly concerning because of the important role that forests play in providing ecosystem services such as maintenance of soil quality, and because the country's human population relies heavily on remaining forest patches as a source of traditional foods and medicines. Therefore, it is critically important to develop effective strategies for the conservation of Togo's remaining forested areas.

Forest patches in Togo also play an important cultural role as a site for the practice of traditional religions. Throughout this thesis, we will consider the differences between community forests that contain sacred sites ("sacred forests") and those that do not. The terms "community forest," "sacred forest," and "sacred site" are used regularly throughout the thesis and can be defined as follows:

- A "community forest" refers to any forest that is managed by a community group such as a village, neighborhood, or large family group. Some, but not all, community forests considered in this study are also "sacred forests."
- A "sacred forest" is a forest that is used for religious or spiritual purposes. These forests may be inhabited and protected by gods, totem animals, or ancestors. All sacred forests considered in this study are also community forests. Sacred forests are also referred to as "sacred groves" throughout much of the scientific literature. We chose to use the term "sacred forest" rather than "sacred grove" in this study due to the unusually large size of some of the forests considered.

- A "sacred site" is a particular location within a sacred forest that is used for worship, prayer, or traditional ceremonies. Sacred sites may include shrines where sacrifices can be made to gods, the habitats of totem animals, or historical sites considered to be the present-day home of the ancestors.

1.1 Purpose

This study considers factors that have affected the maintenance of sacred forests and other communally-managed forests in Kaboli, Togo. In West Africa, sacred forests play an important cultural role and have been found to contribute significantly to the conservation of forest resources (Campbell 2004, 2005; Kokou & Kokutse 2007; Kokou et al. 2008). In many parts of Togo, sacred forests represent the only remaining forested areas and therefore provide important refuges for biodiversity (Kokou et al. 2008). This study focuses on four community forests, including three sacred forests, near the town of Kaboli, Togo. Understanding what contributed to the successful maintenance of some of these forests may help us conserve similar forests in the region.

1.2 Study Questions

This thesis presents a case study focusing on the four community forests described above in an attempt to gain insight regarding successful community forest conservation practices and the role of sacred forests in community forest conservation in West Africa. Specifically, this thesis aims to address three questions:

1) What is the ecological value and level of degradation of community forests, including sacred forests and community forests that are not sacred, in Kaboli Togo?

2) What factors are associated with successful or unsuccessful protection of intact ecosystem within Kaboli's community forests? and

3) What are potential future strategies for the conservation of community forests and sacred forests in Kaboli and other culturally or ecologically similar communities?

1.3 Need for the Study

In Togo, a significant portion of communally managed forests are "sacred forests," or forests that have been maintained due to religious or spiritual significance. Throughout the

world, sacred forests provide a location in which traditions and rituals can be upheld, allow people to connect with their families, ancestors, and history, and contain a variety of non-timber forest products. For example, game, medicines, and edible plant products are all collected in sacred forests (Dugast 2006; Kokou et al. 2008; Fournier 2011). Due to their tendency to be maintained over long periods of time, sacred forests often contain ecological communities that have otherwise been removed from a region, and play an important role in the conservation of biodiversity (Decher 1997; Mgumia & Oba 2003; Campbell 2004; Bosart et al. 2006; Sanou et al. 2013). As a result of their essential social and ecological functions, it is necessary that communities of both social and natural scientists gain a clear understanding of the role that sacred forests play within social-ecological systems, the ways in which they have changed over time, and measures that could be taken to ensure their continued existence.

The majority of research focusing on sacred forests has been carried out in India. Most of these studies have focused on ecological aspects of sacred forests and their ability to contribute to the conservation of biodiversity (Khiewtam & Ramakrishran 1993; Parthasarathy & Karthihayan 1997; Upadhaya et al. 2003; Bhagwat et al. 2005). Additionally, a smaller group of studies have used methods in the social sciences to explore ways in which sacred forests contribute to local culture and livelihoods. These studies address the effects of traditional community-based management systems on the maintenance of sacred forests (Debal & Malhotra 1997; Jaiswal 2010; Negi 2010).

Finally, several studies have been carried out that combine ecological and social methods to gain a more complete understanding of the ability of sacred forests to contribute to the conservation of both culture and biodiversity. These interdisciplinary studies have contributed to an understanding of measures that are needed to ensure the long-term sustainability of sacred forests (Chandrashekara & Sankar 1998; Khumbongmayuma et al. 2005). While this research has begun to create a body of knowledge regarding the conservation of sacred forests, it is important to note that the socio-ecological systems surrounding sacred forests vary greatly based on the climatic, cultural, and political frameworks in which they exist. Therefore, it is important to consider specific local contexts when making management decisions regarding sacred forests. More studies are needed that explore the role of sacred forests throughout the different regions of the world in which they exist (Ormsby 2011; Bhaghwat et al. 2011).

Approximately half the population of Togo practices indigenous religions that rely on the use of sacred forests for ceremonial purposes, burial grounds, and communication with gods and ancestors (Kokou et al. 2008; Indexmundi 2013). Many of the community forests that local populations rely on for the collection of non-timber forest products are also sacred forests (Kokou et al. 2008). Additionally, sacred forests have a particularly important role in conservation in Togo due to especially high levels of deforestation within the country (ITTO 2005). In many parts of Togo, sacred forests represent the only remaining forested areas and therefore provide important refuges for biodiversity (Kokou et al. 2008).

Despite the social and ecological significance of sacred forests in Togo, research addressing the role of religion in community forest management has been minimal. The majority of studies that have occurred have focused on vegetation structure and diversity within the forests and do not include analyses of the social aspects of this system (Kokou et al 1999a, 1999b; Kokou & Caballe 2000, Tchamie & Komlan 2000; Kokou & Kokutse 2006). These studies are certainly important and have helped build an understanding of the ways in which sacred forests contribute to biodiversity conservation (Kokou & Caballe 2000; Tchamie & Komlan 2000) and forest regeneration (Kokou et al. 1999b, Kokou & Kokutske 2006) within the country. However, research addressing both social and ecological aspects are needed to examine the forces driving the maintenance of sacred forests and consider communities' future options regarding the conservation of their forests.

To my knowledge, only one such study has been carried out in Togo (Kokou et al. 2008). This study provided a clear overview of the vegetation structure and species composition of sacred forests throughout the country along with a description of the ways in which they are used by local communities (Kokou et al. 2008). While this work provided a starting point, further studies are needed to explore the ability of sacred forests to contribute to conservation, community use and management of sacred forests, and changes that have occurred in these systems over time.

Case studies including both social and ecological components may be particularly useful because they will allow for a deeper understanding of the complex interactions occurring within local social-ecological systems. This is especially important because an understanding of the factors leading to successful conservation of sacred forests in Togo may provide insights that

could be used to develop conservation strategies for other communally managed forests throughout West Africa.

1.4 General Study Methods

This research was carried out between August 2014 and August 2016 while I was serving as a Peace Corps Volunteer in Kaboli, Togo. Working as a Peace Corps Volunteer provided me with the opportunity to gain a better understanding of local culture and social norms, build friendships and professional relationships with people in town, and give community members a chance to get to know and trust me that would have been difficult to find under other circumstances. I spent most of the first year I lived in Kaboli focusing on integrating myself into life in town, making connections, and working on food security projects related to my role as a Peace Corps Volunteer.

Before I could begin data collection, I needed to gain the permission of appropriate authorities in town. As an outsider approaching authority figures in Kaboli it is generally most appropriate to be accompanied by somebody local who can act as a character reference and a translator if necessary. I first discussed my research project with the President of the Village Development Committee who then accompanied me to request the permission of the Chief of the Canton. After gaining the permission of the Chief of the Canton, I approached the Chiefs of each of the four family groups I was interested in working with. Several colleagues from my Peace Corps work who had connections to the quartiers with whom I was interested in working were willing to accompany me as I made these requests.

During each visit, I explained who I was and what my proposed research would involve. Two of the quartiers I visited granted me permission immediately while two others arranged meetings of the elder's committee before coming to a decision. The Kala Family deliberated for over seven months before granting me permission to carry out interviews and forest surveys, and required slight changes to my study methods.

While these initial steps were time-consuming, they were necessary to ensure that my research was carried out ethically. Several families participating in the study had previously experienced negative interactions with researchers and state foresters, and were wary of sharing information that they thought could potentially be used against them in the future. It was necessary to take the time to clarify exactly what my objectives were and to discuss whether

there were ways in which the families participating might also be able to benefit from the process. Based on these conversations, I worked with the Sabi Family to make connections with the Ministry of the Environment and Forest Resources in order to begin the process of officially registering their forest as a community forest, and introduced the Homogé Family to state foresters and members of a local non-governmental organization with whom they wished to discuss potential future projects for the improvement of their forest.

These conversations that I held before beginning my data collection were ultimately very helpful for me as well because many of the people who I connected with initially later helped me arrange and translate focus group interviews, map the boundaries of the four community forests, and even find lodging for carrying out field work. After gaining the necessary permission required to conduct this research, I began carrying out focus group interviews, mapping community forest boundaries, and surveying forest composition. The specific methods used in data collection will be discussed in chapters 3 through 5.

1.5 Considerations of Study Quality

This study uses a mixed methods approach, combining quantitative ecological data with qualitative focus group interviews to gain a more complete understanding of the role that community forests play in Kaboli. Traditionally, quantitative research is often evaluated based on the four criteria of "representativeness," "reactivity," "reliability," and "replicability." Considering the interdisciplinary nature of this study, it is important to discuss the ways in which these criteria can be used to evaluate both quantitative and qualitative methods. Katz (1983) provides an interesting perspective on the ways in which studies using analytical induction can meet these four criteria.

"Representativeness" refers to the extent to which a study's results can be usefully applied to other scenarios. Generally, a study with many cases including the full diversity of the actual population considered would be considered to have high representativeness. However, Katz (1983) explains that when analytical induction is used, a study involving a few cases with high levels of variability or change within them provides more opportunities to explain negative results and therefore gain an understanding of processes that can be applied to other situations. Four community forests located near the town of Kaboli, Togo are considered in this study. While it is true that these four forests are unlikely to capture the full diversity of sacred forests in

Togo, interactions between these forests and community members are complex and changing rapidly. According to Katz, these circumstances might in fact contribute to a relatively high level of representativeness for the social aspects of this study. However, considering the ecological aspects of this study, it is important to recognize that only dry deciduous forests of Togo's Centrale region were considered. Vegetation composition would certainly be expected to differ in other regions of the country.

The "reactivity" of a study considers whether results were affected by the presence of the researcher. We can say with confidence that the level of reactivity of the forest surveys carried out as part of this study was very low; our research methods involved only observation and did not change vegetation composition in any significant way. However, it is clear that the way we were perceived by study participants did affect their responses to interview questions. Katz (1983) points out that in some cases, this reactivity can actually allow for a better understanding of communities. For example, in this study, certain participants were reluctant to share information with us as a result of our status as scientists and because it was assumed that we were associated with the state government. This response allowed us to better understand the relationship between community members, researchers, and state foresters. It did also limit our access to certain information and increase the likelihood that false information may have been provided during interviews.

A study with high "reliability" is one in which the reader is confident that the data have been presented in a clear and unbiased way. This can be accomplished through the use of preset methods for data collection and analysis. The ecological component of this study has a high level of reliability. Survey points were chosen randomly and the same procedure was used at each survey point. Based on the same criteria, the social component of this study also has a relatively high level of reliability. Semi-structured interviews provided structure, and the same coding method was used for all interviews. However, discussions that occurred during interviews were flexible and did vary based on participant interests and comfort levels.

"Replicability" considers whether a study could be repeated by another researcher. This requires that consistent methods are used and clearly described. Both the ecological and social methods used in this study are replicable. Consistent forest survey methods were used throughout the study and survey points could be easily relocated with a GPS. The focus group

interviews carried out addressed the same questions during each interview (see appendix), and a consistent coding scheme was used.

1.6 Study Site

This study considers the social-ecological value and conservation of community forests, and particularly sacred forests, in Kaboli, Togo. Kaboli is located in the Tchamba Prefecture of the Centrale Region of Togo, approximately six kilometers from the country's border with Benin (Fig. 1.1).

Figure 1.1. *Kaboli is located in the Tchamba prefecture in the Centrale region of Togo on the West Coast of Africa*

1.6.1 Socio-Economic Characteristics

In 2010, the town of Kaboli had a population of approximately 21,600 people (Togo Data Portal 2010). It functions as a regional center where people from surrounding villages can visit the market or health center and attend school.

Figure 1.2. *Downtown Kaboli on market day (Photo by Anna Muench)*

The majority of residents of Kaboli earn a living through subsistence farming. Primary crops include corn, yams, beans, and rice. Many also supplement their income through the sale of cash crops such as tomatoes, okra, and cashews, a trade such as mechanics, carpentry, tailoring, or hair styling, or the establishment of local businesses such as corner stores or small restaurants.

Religiously, the town is divided between those who practice Christianity, Islam, and Traditional Religion. The traditional religion practiced by most people in Kaboli is that of the Yoruba people from Nigeria. This tradition states that human life originated in Ile Ife, Nigeria and was originally molded out of clay by the orisha (spirit) Obatala (Anderson/Sankofa 1991). Local gods live inside sacred forests and those who wish can pray to them and make sacrifices.

Figure 1.3. *Kaboli resident watering his tomato fields (left) and the setup of a small shoe sale business (right) (Photos by Anna Muench)*

1.6.2 Ecological Characteristics

The country of Togo is located within the Dahomey Gap, a break in the West African tropical forest resulting from dry winds blowing off the Sahara Desert (Sayer et al. 1992). The southern portion of the country experiences the most rainfall and the climate becomes progressively drier moving north. In the Centrale region of the country where Kaboli is located, the landscape can be categorized as Guinean savannah with interspersed patches of dry forest. Annual rainfall is between 1200 and 1500 millimeters which falls during the rainy season between May and October. The temperature ranges from 25 to 40 degrees Celsius and the soil within this region is generally tropical ferruginous (Kokou et al. 2008).

1.6.3 Political Structure

The town of Kaboli is made up of thirteen quartiers. The term "quartier" is a French word that translates directly as "neighborhood." However, the word has taken a somewhat different meaning in Kaboli. Each quartier has its own history, its own chief, and its own designated portion of land including residential land in town, agricultural land, and community forests. Some quartiers are composed of a single large family group while others include two or more family groups. Quartier chiefs and quartier committees of men, women, and elders are generally responsible for making decisions and resolving conflicts within the quartier. The chief

of the canton, who also lives in Kaboli, is involved in decision-making for matters that concern the entire town and surrounding villages. Additionally, the President of the Village Development Committee is an elected position filled by a town resident who plays a role in organizing town projects and events.

There is also a police station and a foresters' office in town. Police officers and foresters are appointed by the state and are involved in the enforcement of state regulations. In many cases, residents prefer to manage problems within the town's traditional leadership structure. However, police officers and foresters may be called on by community members when they feel that extra authority is needed.

1.6.4 History of Kaboli

According to oral history, Kaboli was founded by the Yoruba hunter Odin Amao. One year, as he was travelling from Nigeria in search of animals to hunt, he came across the land that now makes up Kaboli. He found that wild animals were abundant and the area was very good for hunting, so he returned several times in his travels to hunt and bring food back to his family in Nigeria. Eventually, he began to consider the idea of permanently moving his family to the area. In order to test whether Kaboli could provide a suitable location to establish a village, Odin Amao left a hen in the forest one year before he returned to Nigeria. When he came back the next year, the hen had not only survived but produced nine offspring. These nine chicks represent the original nine quartiers of Kaboli. Odin Amao knew then that he would be successful in establishing the village of Kaboli, and so he brought his family to join him and moved permanently to the area.

While Odin Amao is recognized as the founder of Kaboli, he was not the first to arrive. Several other groups of people, including the Sabi and the Kala people, were already living in nearby forests. When Odin Amao arrived in Kaboli, he met these people and created friendships and trading relationships with them. For example, the Kala people were metal workers and he travelled to Kala in order to buy arrow tips with which to hunt.

Unfortunately, these early years were a time of war. The Dahomey Empire, one of the major players in the trans-Atlantic slave trade, was located only a short distance east of Kaboli and regularly raided the area in search of slaves to sell on the coast (Manning 1982). In addition to being an exceptionally skilled hunter, residents of Kaboli explain that Odin Amao possessed strong shamanic powers that allowed him to protect himself and others from invaders. For

example, if he knew that an army was coming, he would send scouts to determine which direction they were coming from. When he knew, he would shoot a single arrow in their direction and the entire coming army would die at once. Odin Amao therefore invited his neighbors to come and live together with him so that he could protect them as well. This is how the original nine quartiers of Kaboli were founded.

Community forests belonging to various family groups in the area surrounding Kaboli also played an essential historical role during this time period. Many families used their forests as strongholds from which to fight incoming kidnappers. Ditches, or *yaa* were dug around the forests. Pikes were placed at the bottom of these ditches and they were concealed with vegetation. Slave traders searching the area on horseback would fall through and be killed. Some forests also had magical abilities to protect residents of Kaboli. For example, the Sabi forest, which belonged to the Sabi family was invisible to enemies, who would walk straight through it without seeing anything that was there.

Figure 1.4. *Remnants of a yaa from the time of the slave trade. These ditches, filled with spikes and hidden with brush, were used to trap kidnappers.*

The period of colonization closely followed the years of the slave trade. According to Manning (1982), Kaboli was incorporated into French colonies when the Dahomey Empire was conquered in 1893 and then ceded to German Togoland in 1913. Togoland was then divided

between the English and the French in 1914, and Kaboli became the property of French Togo (Cogneau & Moradi 2014). Residents of Kaboli describe a strong German influence in the town. In fact, one of the town's quartiers is still referred to as "Djama," an altered pronunciation of the word "German." According to residents of Kaboli, a group of German people involved in promoting new agricultural techniques lived in this neighborhood in colonial times and constructed several of the buildings currently existing there. Kaboli remained a village of Togo when the country gained its independence from the French in 1960.

Over the past approximately fifty years, Kaboli has grown from a small village to a regional center. The population is growing rapidly as is the footprint of the town. Deforestation has occurred rapidly as the town's residential area has expanded into land that was previously farmland and farmland has expanded into surrounding forested areas. Today, Kaboli is a regional center for people living in surrounding areas. The town includes two health centers, three high schools, a large weekly market, a post office, two micro-lending agencies, and a multitude of small shops and businesses located in the downtown area.

1.6.5 Role of Community Forests

Just as community forests have played an essential historical role in Kaboli, they continue to play an important role in the town's social, economic, and cultural life today. Each quartier of Kaboli owns one or more community forests. Some of these forests belong to the entire quartier while others belong to specific family groups within the quartier.

Communal forests in Kaboli provide important natural resources that are often used for both subsistence and income-generating activities. Residents of Kaboli use many of these community forests as a source of firewood, medicinal plants, and seasonings for cooking. Quartiers may also use their community forests as a source of income by selling rights to harvest wood or hunt within them.

In addition to the consumptive uses of community forests in Kaboli, these forests also play an important social role within the community. Many are in fact sacred forests, or forests that are used for religious or spiritual purposes. Kokou & Sokpon (2006) developed a classification system for sacred forests based on the ways they are used by local communities. They described four categories of sacred forests including hunting reserves, forest cemeteries, ancestor forests, and forests of "voodoo" (Table 1.1). In Kaboli, we observed sacred forests

playing the roles of hunting reserves, ancestor forests, and forests of gods. In many cases, a single sacred forest seems to play more than one of these roles.

Table 1.1. Main sacred forest categories in Togo from Kokou et al. 2008 in *Ecological Indicators*

Table 2 – Main sacred forest categories in Togo		
Category	Sub-category	Social and cultural functions
Hunting reserves		Local communities practice hunting and regularly extract honey and NTFPs. Rituals involve a sacrifice to the god at the beginning of every hunting period
Ancestor forests	Personal or individual forests	Protected by a person in honour of his ancestors or gods for his own security and well-being
	Communal forests	Rituals concerning members of a particular family, however, can also concern the community. Located on particular sites as symbols of the community's history in war periods (place of a fight with enemies, old house of the common ancestor). The existence of historical artifacts (stones of structural support, millstones, shards of pottery) are often found in these forests
Forest-cemeteries		Forest biotopes are used as the burial ground for those who have died from unfortunate circumstances such as road accidents; fire accidents; maternal death; epidemics like smallpox, chickenpox, measles; thunderstrike victims and drowned persons
Forests of "voodoo"		Shelter protective gods or geniuses of the local populations. These areas are fully protected, where entry is strictly forbidden. On days of ceremonies, only locally initiated people are allowed to enter

1.6.6 Quartiers and Community Forests Considered in This Study

This case study focuses on four of Kaboli's community forests. The Legu Forest belongs to the Atafa quartier, the Sabi Forest belongs to the Sabi family of the Adobia quartier, the Kala Forest belongs to the Kala quartier, and the Lamassou Forest belongs to the Homogé family of the Kpomossaro quartier. All four forests are located within 25 kilometers of Kaboli and range from less than a hectare to 509 hectares in area. The sizes of the four forests are shown in Table 1.2 and maps of them in Fig. 1.4.

Table 1.2. Overview of four community forests considered

Forest	Total Area (Hectares)	Size Relative to Largest Forest	Sacred Forest?	Family Group
Legu Forest	158	31%	No	Atafa
Sabi Forest	275	54%	Yes	Sabi
Kala Forest	509	100%	Yes	Kala
Lamassou Forest	.05	0%	Yes	Homogé

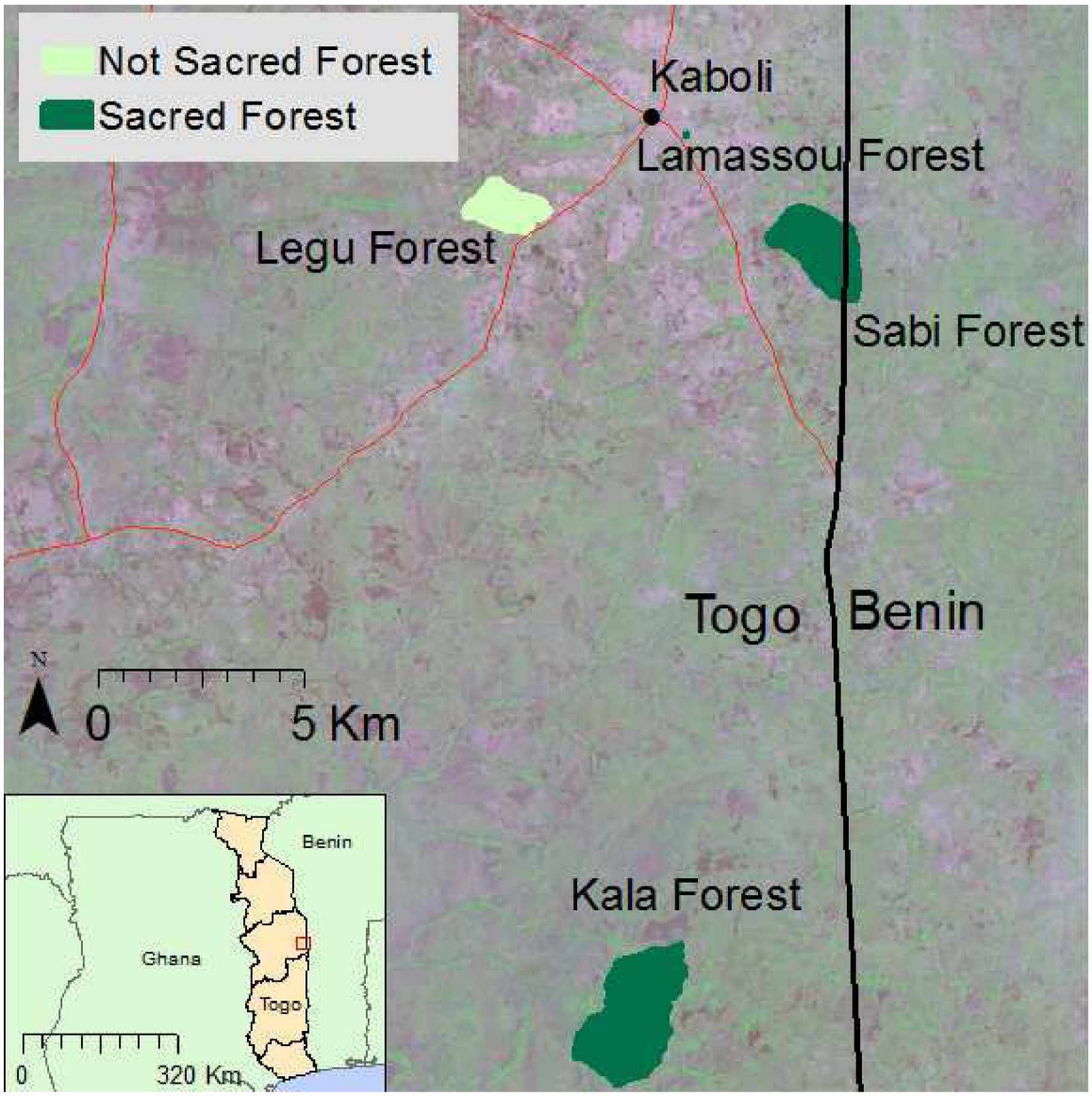

Figure 1.5. *Map of the four community forests involved in this study including the Legu Forest, the Lamassou Forest, the Sabi Forest, and the Kala forest*

We identified the Sabi, Kala, and Lamassou community forests as sacred forests while we did not consider the Legu forest to be a sacred forest. This distinction was made based on conversations that occurred during focus group interviews with members of the Atafa, Sabi, Kala, and Homogé family groups. Family members were asked whether their community forests were used as sites for the practice of traditional religion. Members of the Sabi, Kala, and Homogé families explained that shrines to local gods exist within their forests while members of

the Atafa family reported that no shrines exist within their forest and that it has never been used as a religious site, although they did identify a nearby sacred site that falls outside the boundaries of the Legu forest.

Each of the "forests" considered in this study are part of a land use matrix that includes agricultural land, plantations, residential areas, and other forests. Because land use has changed over time, there are now areas of land falling within traditional forest boundaries that are deforested. While this deforestation is often the result of human activity, it is also important to note that in some cases the land may naturally be a savannah ecosystem. Additionally, in some cases the "forests" considered in this study are bordered by other forests. Therefore, historical forest boundaries do not indicate the current boundaries of areas with tree cover. However, community members belonging to all four family groups refer to the land falling within the historical forest boundaries as a "forest." In this paper, the names "Legu Forest", "Sabi Forest", "Kala Forest," and "Lamassou Forest" will be used to refer to the historic forest boundaries that are still recognized by community members today despite changes that have occurred within all four forests. These boundaries simply represent an area of land belonging to a certain group of people and used for certain purposes. Descriptions of the four forests are presented below, in order from largest to smallest.

Kala Forest (the largest forest and one that is still used for traditional ceremonies)

The Kala Forest, located approximately twenty kilometers from Kaboli and with an area of approximately 509 hectares is both the largest forest and the farthest from Kaboli. The Kala Forest is a sacred forest whose main importance comes from its role as the present-day home of the ancestors. Members of the Kala family explain that the ancestors can sometimes be heard mourning or celebrating inside the forest; when living members of the Kala family dance and drum in Kaboli, the ancestors can be heard dancing and drumming in the forest, and if a member of the Kala family dies and people are mourning in Kaboli, the ancestors can also be heard crying in the forest. The Kala people gather in the Kala Forest every two years to pray, celebrate, and hold a ceremony. Based on Kokou & Sokpon's (2006) classification system, the Kala Forest would be categorized primarily as an ancestor forest, but is also used as a hunting reserve.

In addition to its cultural role, the Kala Forest is widely used as a source of wood and meat. The Kala quartier often grants loggers permission to selectively harvest trees from the

forest at a price of approximately $45.00 for each large tree. Members of the Kala Family hunt regularly in the forest, and members of other quartiers may do so as well providing that they ask permission first and make a gift to the leaders of the Kala quartier when they have finished hunting. Other quartiers of Kaboli such as Atafa whose forests have been mostly deforested often hold communal hunts in the Kala Forest to prepare for festivals.

Figure 1.6. *Photo of the Kala Forest*

Sabi Forest (a sacred forest still used for traditional rituals)

The Sabi Forest, located approximately five kilometers from Kaboli, is an area of 275 hectares and the site where the Sabi people lived before the founding of Kaboli. Based on Kokou & Sokpon's (2006) classification of sacred forests, this forest could be considered primarily an ancestor forest, but it also has elements of a hunting reserve and a forest of the gods. The main significance of the forest comes from the fact that the ancestors of the Sabi family lived there before the founding of Kaboli. Members of the Sabi family gather within the forest once each year to pray, celebrate, and connect with the ancestors. According to members of the family, this forest was once securely protected by several gods who lived within it, and permitted only members of the Sabi family to enter. However, as respect for local religious systems has declined, so has the protection of the forest. Members of the Sabi family explained that many of

the forest gods have left to live elsewhere, although the strongest of them, who takes the form of an enormous boa constrictor, remains.

In the past, hunting was permitted in the forest by members of the Sabi family, but today elders of the family, noticing a decline in both tree cover and wildlife within the forest, have stated that no hunting or logging should occur within the forest (although exceptions may be made for family members in need of a single tree for personal use). The enforcement of these regulations has proven to be particularly difficult for the Sabi family, due in part to the fact that the national border between Togo and Benin now falls inside of the forest. As a result, the Sabi family has turned to the state forest service in hopes of increasing their ability to protect their forest, and is currently in the process of officially registering the Sabi Forest as an official Community Forest with the Ministry of Environment and Forest Resources.

Figure 1.7. *Patch of regenerating secondary forest in the Sabi Forest*

Legu Forest (a community forest with no sacred site now used mainly for agriculture)

The Legu Forest, an area of approximately 158 hectares, is located approximately four kilometers from Kaboli and is the only community forest in this study that does not contain a sacred site of any kind. This forest belongs to the Atafa quartier although this fact is disputed by the Sabi quartier who argue that the land belongs to them. The Legu Forest was the site of a village many years ago, and remnants of protective ditches or *yaa* used to defend against slave traders can still be seen surrounding the forest. Some members of the Atafa quartier state that

the people who lived in the Legu Forest were the ancestors of the Atafa people while others say that they were a different group of people who had already left before the Atafa people arrived in Kaboli with Odin Amao, the founder of the town.

Today, the Legu Forest is used mainly for agricultural purposes. The newly cleared land available in the area is said to be particularly fertile and is highly valued by farmers because crops can be produced even without the use of fertilizer. Decision-making related to land use within the Legu Forest is made by the Atafa quartier's land use committee, although the elder's committee and the chief of the quartier may be consulted to answer more complex questions or settle disputes.

Fig 1.8. *A woman clearing brush in the Legu Forest*

Lamassou Forest (small sacred forest located within Kaboli and still used for traditional ceremonies)

The Lamassou Forest, belonging to the Homogé Family of the Kpomossaro quartier, has an area of only 0.05 hectares and plays a different role than the Sabi and Kala Forests. This forest could be classified as a Forest of the gods based on Kokou and Sokpon's (2006) classification system. The most important aspect of this forest is a small pool of water within it that contains the family's sacred catfish. These catfish are incredibly important to the family because each human member of the family is represented by a catfish found within the pond.

According to family elders, when a new baby is born, a catfish is also born in the pool, and when an elder dies his catfish swims onto the bank of the pool and dies as well three days later. The forest is also the home of a god, and people travel from as far away as Cote d'Ivoire, Nigeria, and France to pray to this god who may respond to people of any background in addition to members of the Homogé family. People who have prayed to this god and received what they have asked for are required to return to the site to make a sacrifice such as a chicken or goat. Like the Sabi and Kala families, the Homogé family also holds an annual festival inside their forest. This forest is used strictly for religious purposes and nothing may be removed from it unless the forest priest has given his permission (with the exception of small amounts of water that may be taken by members of the Homogé family for healing purposes).

Figure 1.9. *Priest of the Lamassou Forest sitting next to the forest's shrine*

1.7 Structure of the Thesis and Contribution of Authors

This thesis is organized as a set of three manuscripts that will be submitted for publication in different journals with an introduction and literature review preceding the manuscripts and a conclusion summarizing them. Following the introduction, Chapter 2 presents a review of previous work on the role of sacred forests in ecological conservation and human well-being. The social and ecological role of sacred forests in West Africa, particular challenges

faced in their conservation, and potential solutions to these challenges in this region of the world are discussed.

Chapter 3 is a manuscript entitled "Comparison of the ecological value of sacred and non-sacred community forests in Kaboli, Togo." This chapter discusses my results on whether forests with sacred sites in them have been conserved more effectively than similar forests that do not contain sacred sites. Forests are compared based on their tree cover within historic forest boundaries, vegetation composition, biodiversity, and biomass.

The manuscript presented in chapter 4, "Social factors associated with the conservation of sacred forests" uses data derived from focus group interviews with residents of Kaboli to understand the reasons why two of the three forests considered in chapter 3 are better conserved than the other.

Chapter 5, "Effects of the West on human-forest interactions and identity in Kaboli, Togo" focuses more closely on one particular factor that has contributed to forest degradation in Kaboli, discussing the role that western influences have had on the relationships between community forests and people in Kaboli.

Chapter 6 concludes by summarizing the most significant results from the three manuscripts, discussing their relevance to conservation decisions being made today, and identify potential areas for future research.

I wrote the first draft of the research proposal, carried out data collection, and wrote the first draft of each manuscript. Therefore, I will be the first author of each manuscript that is submitted. Susan Todd, the chair of my committee, provided significant feedback on my research proposal along with each manuscript. She will be the second author of manuscripts based on chapters four and five and the third author of the manuscript based on chapter 3. Kouami Kokou provided significant feedback on chapter three and assisted in the identification of vegetation samples. He will be the second author of the manuscript based on chapter 3 and the third author of manuscripts based on chapters four and five. Anthony Gasbarro also provided feedback on my research proposal along with each manuscript. He will be the fourth author of manuscripts based on chapter three, four, and five.

Chapter 2. Review of Previous Investigations

2.1 Role of Religion in Conservation

Nature plays an important role in nearly all faiths practiced around the world historically and today, including both mainstream religions and more local indigenous belief systems. This connection between faith and the natural world has the potential to contribute to environmental conservation, and some of the earliest systems of natural resource conservation have been based on religious principles (Kokou et al. 2008; Dudley et al. 2009; Frascaroli 2013; Yachkaschi & Yachkaschi 2013; McKay et al. 2014).

Dudley et al. (2009) have suggested that there are two main ways in which religion can benefit conservation. The first is through its ability to affect the attitudes and values of followers. Religious institutions can provide a medium through which conservation values can be taught and an organizational structure that can be used to organize conservation-related activities (Bhaghwat et al. 2011). The second manner that religion can benefit conservation is through the direct conservation of natural areas that are considered to be religiously or spiritually significant (Dudley et al. 2009). These areas are often referred to as sacred forests (Campbell 2004). They hold conservation value as remnants of old growth forests with the potential to harbor biodiversity in areas that are otherwise largely deforested. Additionally, they link connecting habitats that allow animal species to travel between larger protected areas (Bosart et al. 2006; Kokou et al. 2008).

The role of religion in conservation and the concept of sacred forests in particular are especially interesting within the context of community-based natural resource management (CBNRM). CBNRM is a system in which Common Pool Resources (CPR's) are managed by the community that makes use of those resources. Cox (2014) explains that religion can help to implement some of the factors that are required for the effective management of common pool resources. For example, they found that governance functions including distribution of resources, enforcement of sanctions, development of social capital, creation of resource boundaries, structure of leadership within the community, and provision of benefits were addressed in over fifty percent of cases including a "sacred focus" such as a sacred forest (Cox 2014). The management systems surrounding sacred forests may provide an opportunity for researchers to gain a clearer understanding of factors that contribute to success in CBNRM projects.

2.2 Background on Sacred Forests

2.2.1 History and Establishment of Sacred Forests

For millennia, hunter-gatherers relied directly on their local environment to meet all of their basic needs, and this ability of nature to provide life was viewed as sacred. One way they expressed their reverence for the power of nature was through the creation of sacred forests (Anthwal et al. 2010).

Because they were dwellings of deities and places of power, sacred forests often played an important role in the organization of governmental structures within ancient societies (Sheridan 2009; Anthwal et al. 2010). For example, Sheridan (2009) suggests that sacred forests played a key role in the spread of pre-colonial African society. As the population grew, groups of people split off from "core" societies and established new "peripheral" societies that grew in size and structural complexity until they became core societies themselves and new peripheral groups began to split off again. Within this system, sacred forests were essential for establishing new peripheral societies. They indicated the location of the settlement, provided a location in which traditional ceremonies could occur, and acted as symbols of power, prosperity, health, and political legitimacy. Therefore, as human populations spread across the African continent, a network of sacred forests followed (Sheridan 2009).

Today, sacred forests can be found throughout the world, although they are particularly common in Africa and Asia (Dudley et al. 2009; Cox 2014). They function as the homes of spirits or gods, burial grounds, places to connect with ancestors, and areas in which to practice subsistence activities (Kokou et al. 2008). In some situations, the religious and cultural traditions that supported the creation and maintenance of the sacred forests have degraded with time. For example, in Ghana, conversion of much of the population to Christianity has resulted in the suggestion that alternative motivations for conservation of sacred forests such as ecological understanding and ecotourism should be developed (Decher 1997).

Despite these changes, many communities continue to respect the gods and ancestors inhabiting these forests. As a result, sacred forests continue to be successfully maintained in many parts of the world and it has been suggested that conservation within these sacred forests is more effective than conservation within national protected areas in some cases (Kokou et al. 2008).

2.2.2 Sacred Forests and Land Use Change

Ecosystems of countries throughout Africa have been drastically altered since colonization. This degradation is a result of land use changes due to factors such as unsustainable timber harvest, intensification of agriculture, and increased use of livestock (Campbell 2004; Kokou et al. 2008; Sheridan 2009). In many countries, historically forested areas have been transformed to scrubby savannahs (Campbell 2004; Aerts et al. 2006; Kokou et al. 2008). For example, in much of East Africa heavy grazing may have contributed to the formation of shrub savannahs dominated by thorny bushes and succulents (Aerts et al. 2006).

As a result of these land use changes and high levels of deforestation, there are regions in which sacred forests represent some of the only remaining forest cover (Campbell 2004; Kokou et al. 2008). For example, the West African country of Togo is nearly entirely deforested with significant natural forests remaining only as fragmented patches in the southern portion of the country along its border with Ghana. Almost no forest can be found outside of sacred forests (Kokou et al. 2008).

Many authors have suggested that the ecological communities found within sacred forests represent remnant patches of the climax forest that historically occupied the area (Mgumia & Oba 2003; Campbell 2004; Aerts et al. 2006; Frosch & Deil 2011,). For example, Aerts et al. (2006) explain that between 1400 and 1700 the landscape of Northern Ethiopia was dominated by Afromontane *Juniperius* dry forest. Since then, land degradation has resulted in the conversion of the majority of the landscape to shrub savannah. However, patches of this original forest type remain within sacred forests. Evidence for this remnant forest hypothesis often comes from studies which compare vegetation communities in sacred forests to those in mature forests that are assumed to represent local climax communities such as those found within national protected areas (Campbell 2004; Aerts et al. 2006; Mgumia & Oba 2003). For example, one study found that the structure of vegetation communities within sacred forests in the coastal savannah of Ghana was very similar to the structure of intact deciduous forests that still exist in the Southern part of the country (Campbell 2004).

While many studies suggest that sacred forests represent remnants of historical forests, it is important to keep in mind that they are part of a dynamic social-ecological system and are influenced by the human communities that make use of them (Sheridan 2009; Fournier 2011). Fournier (2011) argues that the sacred forests were not created for the purpose of biodiversity

conservation but rather to provide a location in which to carry out rituals and rules that are religiously significant. Therefore, in some cases, sacred forests may not represent natural forests but rather human-designed ecosystems. For example, while many sacred forests in Morocco have been found to be representative of historical climax forest communities, sacred olive groves are often grown in regions where the natural climax community is expected to be an oak forest (Frosch & Deil 2011). These olive groves clearly do not represent the result of undisturbed successional processes, but rather were formed through intensive management.

2.3 Current Structure and Use of Sacred Forests in Togo and Surrounding Regions

West Africa is one area of the world in which sacred forests are common and generally well-respected (Gordon 1992; Kokou et al. 2008; Barre et al. 2009). For example, in Ghana there are 2,000 known sacred forests that vary in size from a single sacred object such as a tree or stone to forests covering hundreds of hectares of land (Gordon 1992). In the country of Togo sacred forests are found in most villages and have an average size of 0.74 hectares (Kokou et al. 2008).

The use of sacred forests in West Africa is generally controlled by local chiefs or religious leaders (Kokou et al. 2008; Barre et al. 2009). For example, in the Tallensi-Nabdam region of Ghana, mediators between gods and people, referred to as *Ndaan*, have the authority to enforce the rules surrounding the use of the sacred forests. People who break a taboo in the sacred forests are expected to report to the *Ndaan* who will suggest that they make an offering to the gods in order to gain forgiveness. The payment required is based on the severity of the transgression and may be a chicken for a smaller offense or goat for a larger offense. It is generally believed that if a person breaks a taboo and does not make an apology offering to the gods they will experience a negative consequence such as illness or an unfortunate accident. Although traditional belief systems are being replaced with proselytizing monotheistic religions such as Christianity in many regions, most people continue to abide by the traditional regulations regarding the sacred forests either because they fear the bad luck that results from breaking the taboos or because they want to avoid the fines charged by local leaders to those who fail to follow the regulations (Barre et al. 2009).

There are a variety of different types of sacred forests, each with a different purpose and different regulations surrounding use (Kokou et al. 2008; Barre et al. 2009). In Togo, sacred

forests can be divided into four general categories. The most strictly protected forests are "forests of voodoo" which are the homes of gods who protect the local area. Activity within these forests is stringently regulated and only approved people may enter for ceremonial purposes. Ancestor forests are associated either with a particular family or with an entire community. The purpose of these forests is to honor ancestors or gods. They are often located on areas that are historically significant to the family or community. Forest-cemeteries are generally used to bury people who have died from unfortunate events such as accidents or diseases. Finally, hunting reserves are used by the community for consumptive purposes. While timber harvesting is generally prohibited, wildlife, honey and other non-timber forest products (NTFP's) such as fruits and medicinal plants are collected from these forests (Kokou et al. 2008). For example, African Pepper, Ethiopian Pepper, and False Nutmeg are three NTFP's of particular commercial value that are often collected by farmers in order to supplement their income (Kokou et al. 2008).

2.4 Threats to Sacred Forests in Togo and Surrounding Regions

Despite the fact that sacred forests are protected by traditional regulations regarding their use, there are a variety of factors putting these forests at risk within Togo and other West African countries. For example, farmers whose land lies next to the forests often gradually expand their cultivated fields through the borders of the forests in an attempt to increase their yields. This is particularly true in Togo where there is often very little unused land available for the expansion of agriculture. Additionally, bush fires are common within agricultural fields during the dry season and as farmland often directly borders sacred forests, it is not unusual for fires to spread into them and cause damage to vegetation. Fires also occur within sacred forests as a result of traditional hunting methods that use fire to flush animals. Another implication of the scarcity of available farmland is that when new infrastructure is needed, sacred forests are often chosen over agricultural land for construction sites (Kokou et al. 2008).

Threats such as these may be strengthened due to generational changes in culture, perception, and religious beliefs (Campbell 2004, 2005; Kokou et al. 2008). Campbell (2005) found that in villages within the coastal savannah of Ghana young people were more likely to be skeptical of the power of sacred forests than members of the older generation. They were also slightly more likely to violate taboos regarding the use of the forests. Community members who

were interviewed in Campbell's study attributed these generational differences to increased access to Western culture through the introduction of "new" religions such as Islam and Christianity, local urbanization, and improved access to formal education (Campbell 2005).

2.5 Effectiveness of Sacred Forests in Conservation in West Africa

2.5.1 Success of Sacred Forests as Protected Areas

Despite these current threats to the maintenance of sacred forests, several studies have shown they can contribute to the protection of native forest communities and a variety of rare species (Decher 1997; Campbell 2004, 2005; Bosart et al. 2006; Kokou et al. 2008; Sanou et al. 2013). The strength of this system comes from its relevance to the beliefs, traditions, and lifestyles of local communities (Kokou et al. 2008). The majority of people living near sacred forests respect the gods and ancestors living within them and fear the consequences of upsetting them (Campbell 2004, 2005; Kokou et al. 2005). Additionally, sacred forest are managed by local leaders who are respected within their communities, and as a result residents are likely to trust this system of management (Campbell 2005).

Several studies have found that sacred forests are more likely to be sustained over time as forested habitat than nearby unprotected forest stands. For example, Campbell (2005) found that many unprotected forests near communities in the Accra plains region of Ghana were degraded and reduced in area due to harvest of trees for firewood or converted to farmland while sacred forests only diminished slightly in size. Some authors have even suggested that local systems of regulation surrounding sacred forests are more effective than government control of forest resources (Campbell 2005, Kokou et al. 2008). The governmentally managed Permanent Forest Estate of Togo has been largely degraded due to a lack of compliance with regulations. Of the 83 national forest reserves in the country, 80 have been categorized as degraded in some way and 18 have been completely converted to agricultural land or savannah. The only three reserves in Togo that are categorized as "basically intact" are actually sacred forests that have been recognized as national protected areas (ITTO 2005). This is in contrast to sacred forests in Togo that have only declined very slightly in size in recent years (Kokou et al. 2008).

In addition to their relative lack of disturbance, sacred forests have been found to house native communities of vegetation that have often been destroyed in their surrounding area (Campbell 2004, Sanou et al. 2013). For example, Sanou et al. (2013) found that sacred forests

in the Bwaba cultural area of Burkina Faso were very similar to the Sudanian dry forest (Anogeissus Leiocarpus-Diospyros mespiliformis forest type) which is found in other parts of the country but is very different than the surrounding savannah habitat. In the Accra region of Ghana, Campbell (2005) found that sacred forests had a larger average stem diameter and a higher canopy than nearby woodlots. Additionally, the sacred forests contained a higher proportion of native deciduous forest species while the unprotected woodlots were often composed mainly of exotic neem and mango trees (Campbell 2005).

Sacred forests also provide important habitat for a variety of animal species (Decher 1997; Bosart et al. 2006). For example, Decher (1997) found that sacred forests in Ghana provided important habitat for several species of small mammals. In a comparison between sacred forests and altered habitat found outside of sacred forests, three rodent species and two species of bats were found exclusively within sacred forests (Decher 1997). Additionally, a study that compared butterfly communities between sacred forests and large reserves in Ghana observed several species that existed exclusively within a single sacred forest (Bosart et al. 2006). These results indicate that sacred forests provide important habitat for a variety of plant and animal communities along with individual species.

2.5.2 Sacred Forests as an Example of Community-Based Natural Resources Management

The concept of community-based natural resource management (CBNRM) is widely cited as a strategy with the potential to simultaneously accomplish social and environmental development goals (Western & Wright 1994). The rationale behind this idea is that if local stakeholders are involved in the management of their own natural resources, conservation efforts may benefit through increased buy-in from local community members and access to their specialized knowledge (Beltrán 2000; Newmark & Hough 2000), while communities may benefit from increased access to natural resources and support from government organizations and NGO's involved in the project (Bunting et al. 1991; Hough 1991; Boudreaux 2007). However, despite its popularity, in reality CBNRM projects have had variable levels of success (Brooks et al. 2013).

The system of sacred forest management in West Africa provides an example in which CBNRM has been used with largely successful results. The management of sacred forests is controlled by respected community leaders and is carried out in a culturally relevant manner (Campbell 2005; Kokou et al. 2008). The majority of these sacred forests have existed for

generations and continue to be preserved despite a scarcity of available natural resources within much of the region and high rates of deforestation and land degradation occurring outside of their borders (Campbell 2005; Kokou et al. 2008).

Considering the relative success of local communities in maintaining their forests over time, it is possible that studying this system could help us to understand some of the factors that contribute to the effectiveness of CBNRM projects and be applied to the development of community-based management in other situations. In fact, in one case the government of Ghana came to this same conclusion, recognizing that the presence of local guardians and public participation within the sacred forest system played an important role in ensuring their sustainability. Using this framework, they developed a fairly successful woodlot-planting project in which they incorporated stakeholders into both the development and implementation stages of the process. Community members were first interviewed regarding whether they believed that the tree stand was needed and respected local fish-smokers were involved in the planting of the trees. When the project was completed, the woodlots were well-respected by the community and the level of compliance with regulations regarding their use was high (Campbell 2005). It is possible that lessons learned from the conservation of sacred forests could apply not only to situations in West Africa regarding religiously significant resources, but also to the successful development and implementation of CBNRM projects around the world.

2.5.3 Incorporation of Sacred Forests into Conservation Policy

Although sacred forests have been shown to be a particularly sustainable framework for the conservation of certain remnant forest communities, it is also important to recognize the limitations of this system. The most important of these limitations is that the majority of sacred forests are quite small in size; the average size of sacred forests in Togo is 0.74 hectares (Kokou et al. 2008). As a result, they often cannot support populations of larger species such as duikers (*Cephalophus monticla*, *Cephalophus silvicultor*, *Sylvicapra grimmia*) or bushbucks (*Tragelaphus scriptus*, *Tragelaphus sylvaticus*). Additionally, small sacred forests cannot support large populations of any give species and therefore these areas may experience a loss of genetic diversity (Decher 1997). The small size of forest fragments within this system can also lead to lower levels of species diversity. For example, Bosart et al. (2006) found that communities of butterflies were significantly less diverse within sacred forests than within larger protected areas in Ghana. These limitations of sacred forests indicate that they should not be

considered a solution to conservation issues on their own, but should be incorporated into a larger-scale system of protected areas.

Within highly fragmented ecosystems it is particularly important to develop a network of habitat patches including both large areas where stable populations can exist and connecting habitat that allows species to travel between these larger patches. Sacred forests in West Africa could become an important component of habitat-networks including larger, government-managed protected areas, smaller woodlots, hedge-rows and thickets. This could contribute to the dispersal of mammal, bird, and insect species between high quality habitat areas, increase genetic diversity and lead to increased stability of populations (Decher 1997; Bosart et al. 2006).

The presence of sacred forests could also play an important role in the regeneration of forested habitat in previously degraded areas. In land that has been cleared of forest, the seed bank within the soil changes over time as tree species are replaced by herbaceous species. As a result, the ability of a forest to regenerate decreases as the amount of time that it has been deforested grows (Teketay 1997). However, the presence of remnant forest patches found within sacred forests can facilitate the regeneration of nearby land through seed dispersal (Aerts et al. 2006). For example, Kokou et al. (1999b) found that when vegetation communities surrounding sacred forests were left undisturbed and allowed to progress through their natural successional stages they grew into forested ecosystems similar to those found within the forests. Additionally, the first species observed to colonize fallow fields were native *Albizia* species that are found within the forests.

While it is important to recognize the role that sacred forests may play in large-scale conservation efforts, careful consideration must be taken in determining how protected areas will be incorporated into national conservation plans (Decher 1997; Bosart et al. 2006; Dudley et al. 2009). The management of sacred forests requires a knowledge of religious belief systems in addition to an ecological understanding of the area, and special steps must be taken to ensure that protected area staff are trained in faith values and are willing to work with local spiritual leaders if these sites are to be incorporated into governmentally managed protected areas (Dudley et al. 2009). Often, local people would prefer that sacred forests are not incorporated into official protected areas because this can result in communities' full or partial loss of control of the area (Decher 1997; Dudley et al. 2009).

However, there are also several advantages of governmental protection for sacred forests. For example, protected area status can lead to increased support from government agencies and non-governmental organizations along with potential opportunities for the development of tourism within the community (Dudley et al. 2009). Additionally, in cases in which cultural and religious change is resulting in decreased local respect for the forests, alternative structures supporting their preservation may be beneficial (Decher 1997; Dudley et al. 2009). Decisions regarding whether continued unofficial community-based conservation or incorporation into the governmentally managed system of protected areas should be used must therefore be made on a case-by-case basis for each individual community (Dudley et al. 2009).

Chapter 3. Comparison of the Ecological Value of Sacred and Non-Sacred Community Forests in Kaboli, Togo[1]

3.1 Abstract

Despite Togo's status as a low forest cover country, remnant forest patches play an important role in conserving biodiversity and ensuring the well-being of the country's human population. Many of these remnant forest patches are sacred forests, ecosystems that are increasingly threatened due to the degradation of traditional religion. This study compares the ecological value and level of degradation of two sacred forests to an otherwise similar community forest that does not contain a sacred site. The sacred forests considered in this study had a significantly higher percentage of tree cover and, based on most measurements, significantly higher levels of biodiversity and biomass than the forest that did not contain a sacred site. Additionally, dominant species within the sacred forests were associated with deciduous dry forest ecosystems while dominant species within the forest not containing a sacred site were introduced plantation species and species associated with savannah ecosystems. These results indicate that the sacred forests considered in Kaboli Togo are less degraded than a similar community forest that does not contain a sacred site. This important role of sacred sites in forest conservation indicates that the most effective way to encourage the preservation of these ecologically valuable systems may be to focus on the preservation of traditional cultural practices. For example, when local religious structures are intact, taboos prohibiting unsustainable forest uses are often particularly effective forms of regulation because the gods enforcing these taboos are powerful and well-respected by community members.

3.2 Introduction

Togo is a country with a naturally low forest cover due to its location in the Dahomey corridor, a break in the West African tropical forest resulting from dry winds originating in the Sahara Desert (Sayer et al. 1992). In recent years, high rates of deforestation have led to the near eradication of certain already rare forest types within the country. For example, dry forests in northern and central Togo have nearly disappeared (Kokou et al. 2008). The United Nations

[1] Chapter 3 prepared for publication in *Conservation Biology*

Food and Agriculture Organization reports that in 2015 only 188,000 hectares of land, or 3.3 percent of the country's surface area was forested (Sama et al. 2015). According to the United Nations Food and Agriculture Organization (FAO), Togo has one of the highest rates of deforestation in the world and lost an average of 5 percent of its forest cover each year between 1990 and 2015 (FAO 2015). The FAO reports that in 2015 only 188,000 hectares of land, or 3.3 percent of the country's surface area was forested (Sama et al. 2015).

Deforestation in Togo is of particular concern considering the important role that forests play in maintaining ecological systems and ensuring the well-being of Togo's human population (Kokou & Sokpon 2006; Kokou et al. 2008). Ecosystem services provided by forests are necessary for the maintenance of subsistence livelihoods practiced by many throughout the country. For example, traditional knowledge clearly indicates the role that forests play in increasing rainfall. This advantage of forested areas has also been demonstrated within the academic community (Makarieva & Gorshkov 2007; Sheil & Murdiyarso 2009), and even small forest patches in fragmented areas have the ability to significantly increase rainfall (Bonan 2008). Forests in Togo also provide windbreaks that protect property and ensure safety during storms. For example, the village development committee of Kaboli has noted that metal roofs are more likely to be pulled from houses during rainstorms in communities lacking protective forest cover. These ecosystem services are increasingly important as unpredictable weather patterns linked to climate change increase the risk of drought, irregular rainfall, and windstorms, causing increased safety and food security concerns. (Giannini et al. 2003).

In addition to the provision of ecosystem services, community forests also play a direct role in subsistence activities and social and cultural life. Activities including hunting, gathering firewood, and the collection of medicinal plants and other non-timber forest products are regularly carried out in forests throughout Togo (Kokou et al. 2005, Kokou et al. 2008). These activities rely heavily on the maintenance of biodiversity; many species traditionally used as sources of food or medicine are found exclusively in forest ecosystems. Additionally, these forests are often valued by community members for their cultural and religious significance; sacred forests provide a space in which people can pray, carry out ceremonies, and connect with their ancestors (Kokou & Sokpon 2006; Kokou et al. 2008).

Much of the remaining forest area in Togo is located inside sacred forests, or forests that have been maintained due to a religious or spiritual significance (Kokou et al. 1999; Kokou et al.

2008). These sacred forests protect rare forest types, contain high levels of biodiversity, and harbor threatened species found nowhere else in the country (Kokou et al. 2008). Unfortunately, the breakdown of traditional religious systems resulting from the introduction of proselytizing religions (Christianity and Islam) has caused reduced respect for sacred forests, resulting in further degradation of these important habitats (Kokou et al. 2005; Kokou & Sokpon 2006; Kokou & Kokutse 2007; Kokou et al. 2008). Research to understand the role that sacred forests play in biodiversity conservation and effective strategies for ensuring their preservation is therefore increasingly important.

While many studies have demonstrated the importance of sacred forests for biodiversity preservation (Kokou et al. 1999; Mgumia & Oba 2003; Campbell 2004; Bosart et al. 2006; Kokou et al. 2008; Sanou et al. 2013), others have pointed out limitations of the role that they are able to play in conservation (Decher 1997). For example, while these ecosystems are often significantly less disturbed than the surrounding landscape, they are also generally quite small and disconnected from each other (Kokou et al. 2008). More case studies specifically comparing the ecological value of sacred forests to that of surrounding landscapes are therefore needed.

This study compares the ecological value and level of degradation of two sacred forests to an otherwise similar community forest that does not contain a sacred site. The level of forest degradation and ecological value are assessed based on the percent tree cover within historic forest boundaries, presence of typical forest-affinity species, and measurements of biodiversity and biomass. We hypothesized that sacred forests would have a higher percent tree cover within their historical boundaries, and that species associated with dry and semi-deciduous forests would be more dominant while introduced species would be less dominant within sacred forests than within the community forest not containing a sacred site. Additionally, we expected measurements of both biodiversity and biomass to be higher in sacred forests than in the community forests not containing a sacred site.

3.3 Study Site

This study was carried out in three community forests surrounding the town of Kaboli, Togo in West Africa. The town of Kaboli has a population of approximately 21,600 people (Togo Data Portal 2010) and functions as a regional center where people from surrounding villages can visit the market or health center and attend school. The landscape can be

categorized as Guinean savannah with interspersed patches of dry forest. Annual rainfall is between 1200 and 1500 millimeters which falls during the rainy season between May and October. The temperature ranges from 25 to 40 degrees Celsius and the soil within this region is generally tropical ferruginous (Kokou et al. 2008).

The town of Kaboli is divided into nine different neighborhoods each of which includes one or more large extended family groups. Each of these extended family groups has a distinct history and leadership structure. Land within and surrounding the town is divided between each of these family groups and includes residential areas, farmland, plantations, and community forests.

Three community forests were examined. These include the Legu Forest which belongs to the Atafa family group, the Sabi Forest which belongs to the Sabi family group, and the Kala Forest which belongs to the Kala family group (Fig 3.1). Each of these forests are located within 25 kilometers of Kaboli and have an area between 157 and 509 hectares. Additionally, they have similar histories and management structures. All three were used 200-300 years ago by early residents of as village sites because the dense forest allowed them to defend themselves from raids carried out by the neighboring Dahomey Empire, which was an important player in the trans-Atlantic slave trade (Manning 1982). The Atafa, Sabi, and Kala family groups who own the community forests today are the descendants of the people who once inhabited these three forests. The chiefs, elders' councils and land use committees of each of these three family groups make decisions regarding forest use and management.

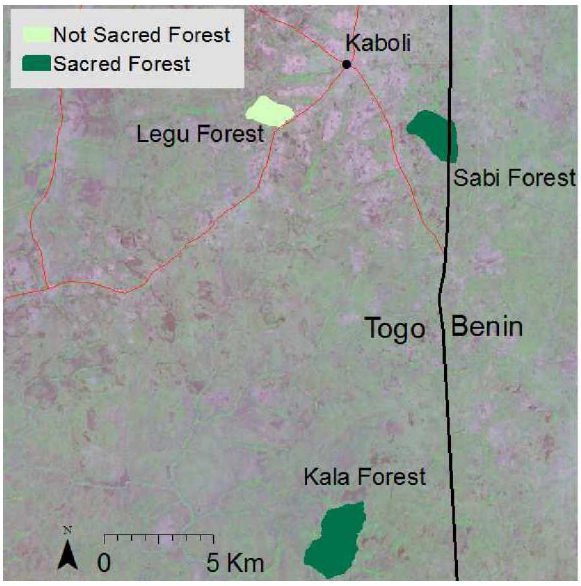

Figure 3.1 *Map of the Legu, Sabi, and Kala community forests. Green lines represent forest boundaries, red lines represent major roads, and black lines represent the Togo-Benin border*

The Sabi and Kala community forests function as sacred forests while the Legu Forest does not. We determined this based on conversations that occurred during focus group interviews with members of the Atafa, Sabi, and Kala family groups. Family members were asked whether their community forests were used as sites for the practice of traditional religion. Members of Sabi and Kala explained that shrines to local gods exist within their forests in the places where their ancestors had previously lived. Members of the Atafa family reported that no shrines exist within their forest and that it has never been used as a religious site, although they did identify a nearby sacred site that falls outside the boundaries of the Legu forest.

Each of the "forests" considered in this study are part of a land use matrix which includes agricultural land, plantations, residential areas, and other forests. Because land use has changed over time, there are now areas of land falling within traditional forest boundaries that are deforested. While this deforestation is often the result of human activity, it is also important to note that in some cases the land may naturally be a savannah ecosystem. Additionally, in some cases the "forests" considered in this study are bordered by other forests. Therefore, historical forest boundaries do not indicate the current boundaries of areas with tree cover. However, community members belonging to all three family groups refer to the land falling within the historical forest boundaries as a "forest." In this paper, the names "Legu Forest", "Sabi Forest", and "Kala Forest" will be used to refer to the historic forest boundaries that are still recognized

by community members today despite changes that have occurred within all three forests. These boundaries simply represent an area of land belonging to a certain group of people and used for certain purposes.

The term "sacred site" will be used to refer to specific shrines or other spiritually relevant landmarks existing within sacred forests. In most cases the specific locations of these sites were not shared with us.

3.4 Methods

3.4.1 Tree Cover

"Tree cover" within the boundaries of each community forest was defined based on the UN Food and Agriculture Organization's (FAO) definition of "forest land." According to the definition used by the FAO, forested land must have at least ten percent crown cover by trees. Therefore, we considered survey plots to be "forested" when they had a crown cover greater than 10 percent and "non-forested" when they had a crown cover less than 10 percent. Other aspects of the FAO's definition of forest land were not considered in our determination of tree cover. For example, the FAO definition requires that land considered to be forest must not be used for agricultural or urban purposes, and defines land that does not currently meet the thresholds but has the potential to meet them in the future as forest land (FRA 2010). As these characteristics cannot be determined based on satellite images, they are not considered here.

Historic boundaries of each of the three community forests (Legu, Sabi, and Kala) were mapped using a GPS unit. Chiefs and elders helped to identify community members who were knowledgeable about the forests and would be able to identify forest boundaries. In all cases, the historic boundaries of the forests were larger than the currently forested areas. We chose to map historic forest boundaries in order to be able to compare the percentage of tree cover within the boundaries of each locally-recognized community forest. In doing this, we assume that land falling within historical forests was entirely forested at the time when their boundaries were first delimited. As we are using the FAO's definition of "forest land" that considers any land with greater than ten percent tree cover to be forested, we believe that this is a fairly reasonable assumption despite the potential historic presence of savannah ecosystems within forest boundaries.

A community forests polygon layer was created based on the GPS forest boundary data. Satellite images from the year 2014 were obtained from Google Earth for each forest. These images were then geo-referenced based on control points created in Google Earth. All maps were projected to WGS 1984 UTM Zone 31.

Maximum likelihood classification in ArcGIS was used to categorize land as either forested or non-forested. The model used for classification was created based on 36 randomly placed training polygons with a radius of twenty meters within the boundaries of the three community forests considered, and the satellite images acquired from Google Earth. The Google Earth images were combined using the "Mosaic to New Raster" tool with a mosaic colormap setting of "MATCH" in order to create a single image that could be used to accurately compare forest cover between the three sites.

A naïve estimate ($\mu_{f,naïve}$) of forest cover indicating the proportion of pixels within historic forest boundaries classified as forest was calculated based on the maximum likelihood raster maps produced. The accuracy of the classification was tested using 37 randomly-placed validation points (McRoberts & Walters 2012; Magdon et al. 2014). First, the bias of the model was determined based on the following equation:

$$\widehat{Bias}(\mu_{f,naive}) = \frac{n_{01}-n_{10}}{n} \quad (3.1)$$

where n_{01} represents validation points where pixels that were actually non-forest were incorrectly classified as forest by the model and n_{10} represents validation points where pixels that were actually forest were incorrectly classified as non-forest by the model, and n represents the total number of validation points used.

This measurement of bias was then subtracted from the naïve estimate of tree cover in order to create a corrected estimate, $\hat{\mu}_f$, of the proportion of forest cover within historic forest boundaries:

$$\hat{\mu}_f = \frac{1}{N}\sum_{i=1}^{N}\hat{y}_i - \frac{n_{01}-n_{10}}{n} \quad (3.2)$$

and the variance of this model was calculated as:

$$\widehat{Var}(\hat{\mu}_f) = \frac{1}{(n-1)}[(1-OA) - \widehat{Bias}(\hat{\mu}_{f,naive})^2] \quad (3.3)$$

where OA represents overall accuracy, or the proportion of validation points that were correctly classified.

Based on this measurement of variance, 95% confidence intervals of forest cover were created for each of the three forests considered:

$$CI(\hat{\mu}_f) = t_{1-\frac{\alpha}{2}}(\sqrt{V\hat{a}r(\hat{\mu}_f)} \quad (3.4)$$

where t represents the $1 - \frac{\alpha}{2}$ percentile of the Student's distribution. These confidence intervals were then used to determine whether or not the percent tree cover within sacred forests (Sabi and Kala) was significantly greater than the percent tree cover with the Legu Forest which did not contain a sacred site (McRoberts & Walters 2012; Magdon et al. 2014).

3.4.2 Vegetation Characteristics

Random survey points were chosen so that one percent of each area would be surveyed. In the case of the Sabi Forest, a portion of the forest fell on the other side of Togo's border with Benin and had been the subject of a long land use conflict between Sabi and Biguna, a town on the other side of the border. As permission could not be obtained from residents of Biguna to carry out research on this portion of land, it was excluded from the survey. A total of 13 survey points were used in the Legu Forest, 19 in the Sabi Forest, and 41 in the Kala Forest.

Each plot was a circle with a radius of 20 meters. All trees with a DBH of more than ten centimeters falling within the circle were included in sampling. This cutoff for DBH was chosen to correspond with a simultaneous study being carried out by the forest service in the nearby Abdulai State Forest. Sampling began in the North and continued clockwise around the circle. Sampled trees were identified to species when possible and otherwise to the most specific achievable taxonomic rank. Unidentified species at each survey point were given a unique identifier so that they could be included in biodiversity and biomass calculations. DBH (diameter of the tree 1.3 meters above the ground) was measured for all trees. If a tree had multiple trunks, all trunks with a DBH greater than ten centimeters were included. Vines meeting the size specifications described were also included in this survey as they contribute to measurements of biodiversity and biomass and represent an important component of these forest ecosystems. Like trees, vines were measured 1.3 meters from their base. Tree height was also estimated using a basic handmade protractor and pendulum clinometer. A smaller circle with a four-meter diameter was drawn at the center of the larger circle. Trees and vines with a DBH between five and ten centimeters were identified and measured within this circle. Forest surveys were carried out during the 2016 rainy season between May and August.

The data collected during forest surveys were used to compare the biomass of the three forests. The biomass of each individual tree was estimated based on DBH, height, and wood density using the pantropical allometric equation proposed in Chave et al.'s 2014 article where AGB_{est} represents estimated above ground biomass (Mg/ha), ṕ represents wood density (g/cm^3), D represents DBH (cm), and H represents the total height of the tree (m):

$$AGB_{est} = 0.0673(\acute{\rho}D^2H)^{0.976} \quad (3.5)$$

Wood density values for individual species or groups of species were acquired from the Global Wood Density Database (Zanne et al. 2009). In cases in which the wood density was not available for a particular species, an average of the wood density for the genus was used. When the wood density was not available at the genus level or the individual was unidentified, a site average of density was used (Sidzabda et al. 2016). This model was chosen over other general tropical models (Brown 1997, Chave et al. 2005) because it was developed using comparatively large datasets, included data points from African forests, and included larger trees with a DBH up to 212 centimeters (Chave et al. 2014).

Additionally, data collected during forest surveys were used to compare the biodiversity of vegetation communities within sacred forests to those within the forest that did not contain sacred sites. Species richness, Shannon's diversity index and the Berger-Parker index were used to measure biodiversity. These three measures were chosen in order to address the effects of both rare and abundant species on biodiversity. Species richness is more effective in measuring changes in biodiversity when rare species are more affected while the Berger-Parker index is more effective in measuring biodiversity when abundant species are more affected. It has been suggested that Shannon's diversity index can be effective when the roles of both rare and abundant species are relevant (Morris et al. 2014). The Berger-Parker index is a measurement of the proportion of a community made up of the most abundant member of that community (Berger & Parker 1970). The Shannon index can be represented by the following equation, where f_i represents the proportion of total individuals belonging to a particular species i (Condit et al. 1996):

$$H' = -\sum f_i \ln(f_i) \quad (3.6)$$

Following the calculation of AGB (above ground biomass) and biodiversity, statistics were used to determine whether the AGB, species richness, Shannon diversity index, and Berger-Parker diversity index were significantly different between the Legu Forest which did not contain a sacred site and the Sabi and Kala Forests which were sacred forests. First, the Shapiro-Wilks test was used to test for normality of data. Because several data sets were found to violate the normality assumption, the non-parametric Kruskal-Wallis test was used rather than an Analysis of Variance to test whether significant differences in AGB and biodiversity existed between the Legu Forest and the Sabi and Kala Forests. A Mann-Whitney test with a Bonferroni correction was used as a post-hoc test to determine which differences were significant and which were not. As our hypothesis was that the two sacred forests considered would have a higher biomass and biodiversity than the forest without a sacred site, we compared the biomass and biodiversity of the Legu Forest to that of the Sabi and Kala Forests, but did not compare the biomass and biodiversity of the Sabi and Kala Forests to each other.

3.5 Results

3.5.1 Tree Cover

The two sacred forests considered in this study were found to have a significantly higher percentage tree cover within their historical boundaries than the community forest that did not contain a sacred site. The overall areas of the Legu, Sabi, and Kala Forests were 158 hectares, 275 hectares, and 509 hectares, respectively. The Sabi and Kala Forests, which were both sacred forests had corrected tree cover estimates of 88 +/- 6 and 98 +/- 6 percent, respectively, while the Legu Forest which did not contain a sacred site had a corrected tree cover estimate of only 62 +/- 6 percent. (See Table 3.1 and Figure 3.2).

Table 3.1 Total area and percent land cover by forests, plantations, and fields of community forests

Forest	Total Area (Hectares)	Size Relative to Largest Forest	Percent Forest Cover	Percent Field Cover
Legu Forest	158	31%	62 +/- 6	38 +/- 6
Sabi Forest	275	54%	88 +/- 6	12 +/- 6
Kala Forest	509	100%	98 +/- 6	2 +/- 6

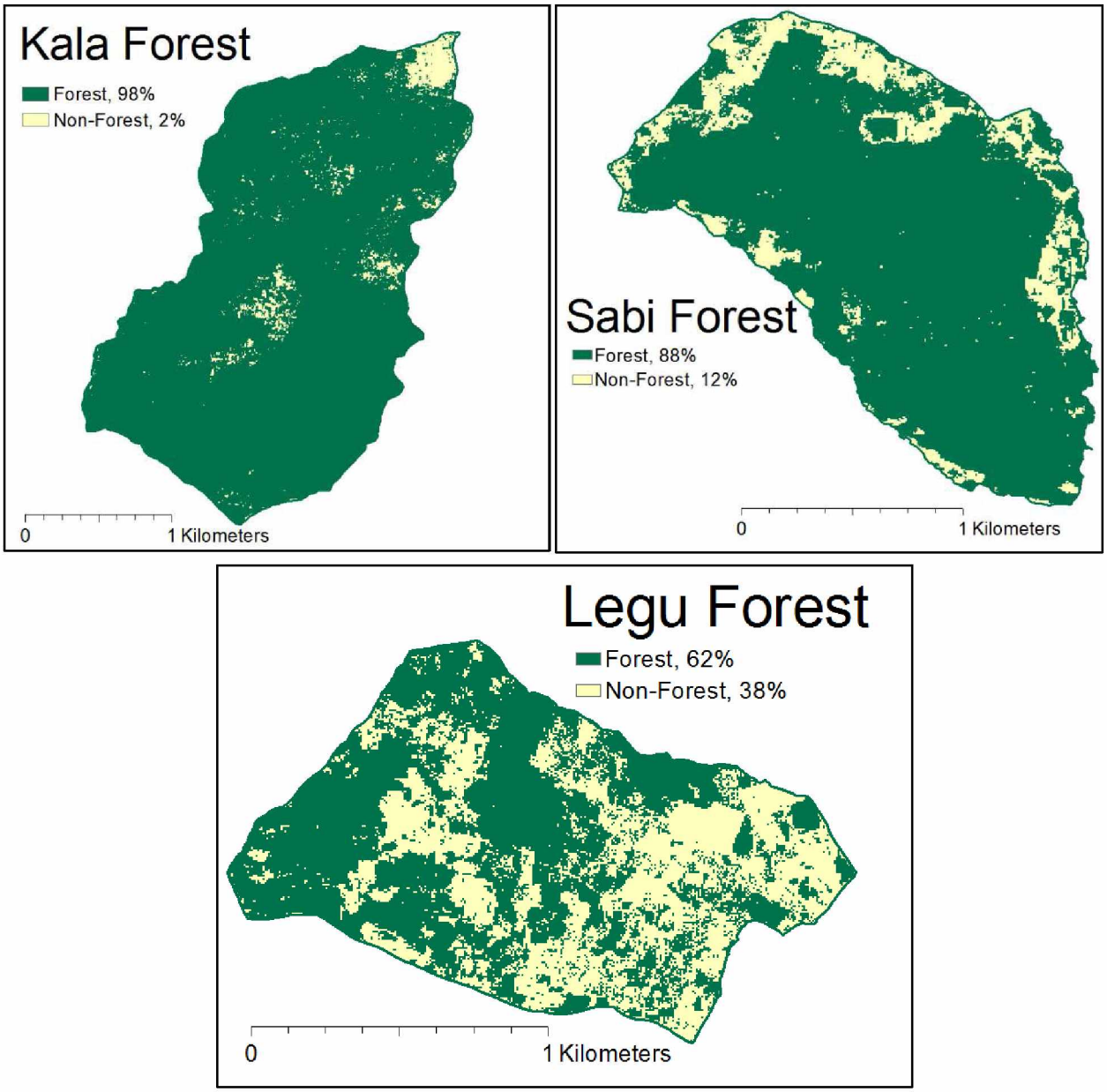

Figure 3.2 *Land cover maps of each of the three forests considered in this study. The Sabi and Kala Forests are sacred forests while the Legu Forest does not contain a sacred site.*

3.5.2 Vegetation Characteristics

The three most common species observed within both the Kala and Sabi forests were *Anogeissus leiocarpus* (making up 13.16% and 17.55% of individuals in each forest, respectively), *Cola millenii* (making up 12.67% and 6.64% of individuals in each forest, respectively), and *Malacantha alnifolia* (making up 8.33% and 16.22% of individuals in each forest, respectively). All three of these species are associated with deciduous dry forests (Hutchinson et al. 1972; Kupicha 1983; Kokou et al. 2008). *C. millenii* is especially common in secondary forests while *M. alnifolia* is a common understory species in deciduous forest, lowland rainforest, and riverine forest (Hutchinson et al. 1972; Kupicha 1983).

The three most common species found within the boundaries of the Legu Forest were *Anacardium occidentale* (making up 24.76% of individuals), *Tectona grandis* (making up 19.42% of individuals), and *Parinari curatellifolia* (making up 8.25% of individuals). *A. occidentale* and *T. grandis* are both plantation species. The nuts of *A. occidentale* (cashews) are sold as a cash crop while *T. grandis* is harvested for lumber. *P. curatellifolia* is associated with savannahs (Hutchinson et al. 1972).

Based on three different measurements, plot-level biodiversity was generally found to be higher in the Sabi and Kala Forests than in the Legu Forest. The average species richness of survey plots was 5.46 for the Legu Forest, 8.79 for the Sabi Forest, and 14.51 for the Kala Forest (fig 3.3). The species richness of the Kala Forest was found to be significantly higher than that of the Legu Forest ($p=1.206*10^{-5}$) while no significant difference was found between the species richness of the Sabi Forest and the Legu Forest ($p=0.1055$). The mean Shannon diversity index was 1.13 for the Legu Forest, 1.67 for the Sabi Forest, and 2.22 for the Kala Forest (fig 3.4). Mean Shannon diversity index values of both the Sabi Forest ($p=.02477$) and the Kala Forest ($7.067*10^{-6}$) were found to be significantly higher than those of the Legu Forest. Finally, the mean Berger-Parker diversity index was 0.59 for the Legu Forest, 0.38 for the Sabi Forest, and 0.30 for the Kala Forest (fig 3.5). Mean Berger-Parker diversity index values of both the Sabi Forest ($p=.00448$) and the Kala Forest ($p=4.738*10^{-5}$) were significantly lower than those of the Legu Forest, indicating that the most common species made up a greater proportion of total individuals in the Legu Forest than in the Sabi or Kala Forests.

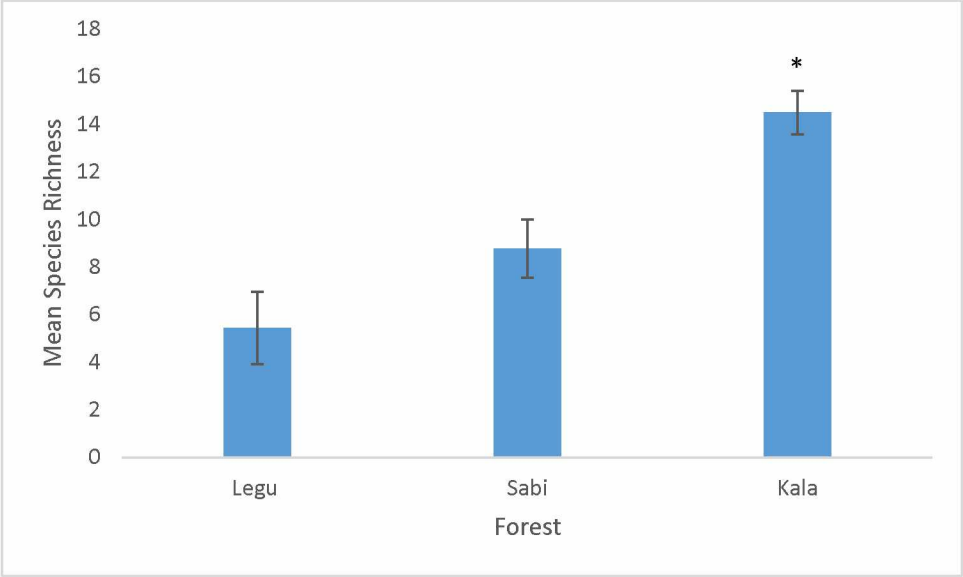

Figure 3.3. *Mean species richness of trees with DBH > 10 cm of plots within the Legu, Sabi, and Kala community forests. Asterisks (*) indicate whether there is a significant difference between mean species richness in the Sabi and Kala Forests (which contain sacred sites) and the Legu Forest (which does not contain a sacred site). Error bars represent SEM.*

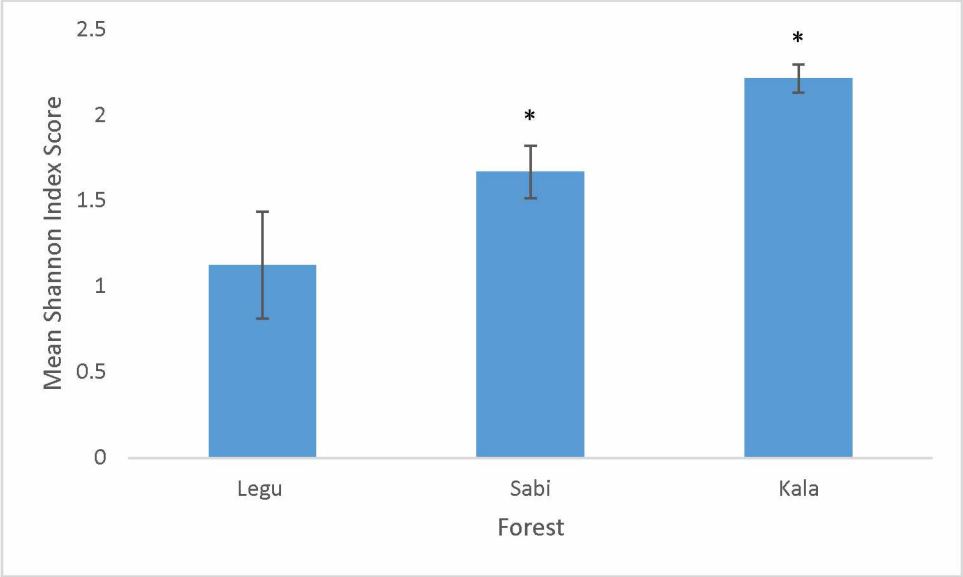

Figure 3.4. *Mean Shannon biodiversity index score of trees with DBH > 10 cm of plots within the Legu, Sabi, and Kala community forests. Asterisks (*) indicate whether there is a significant difference between mean Shannon indexes in the Sabi and Kala Forests (which contain sacred sites) and the Legu Forest (which does not contain a sacred site). Error bars represent SEM.*

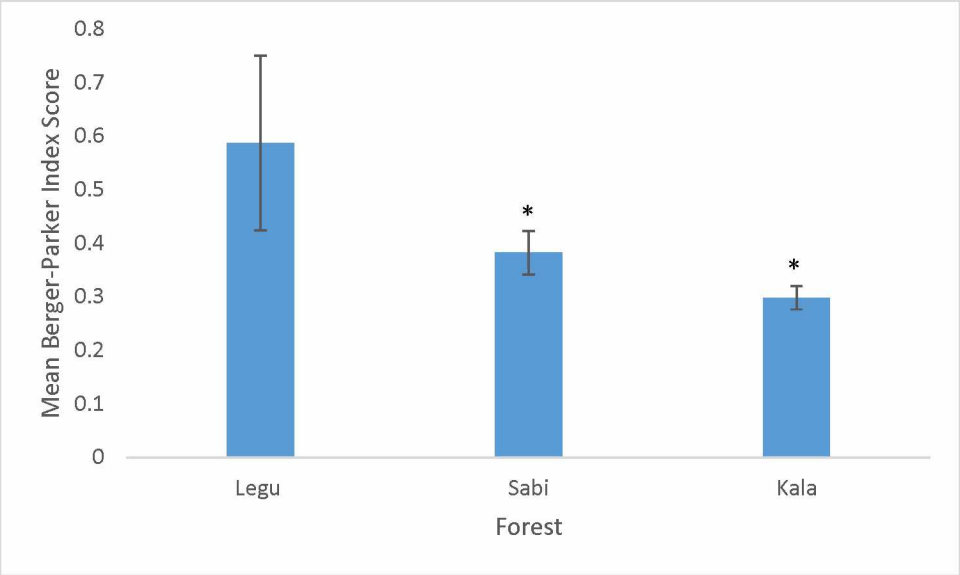

Figure 3.5. *Mean Berger-Parker biodiversity index score of trees with DBH > 10 cm of plots within the Legu, Sabi, and Kala community forests. Asterisks (*) indicate whether there is a significant difference between Berger-Parker Index scores in the Sabi and Kala Forests (which contain sacred sites) and the Legu Forest (which does not contain a sacred site). Error bars represent SEM.*

Above ground biomass was also found to be significantly higher in the Sabi ($p=.0003704$) and Kala ($p=3.427*10^{-6}$) Forests than in the Legu Forest (fig 3.6). The mean AGB of plots within the Legu Forest was 22 Mg/ha, the mean AGB of plots within the Sabi Forest was 104 Mg/ha, and the mean AGB of plots within the Kala Forest was 131 Mg/ha. This indicates that community forests with sacred sites in them stored more biomass than the community forest that did not contain a sacred site.

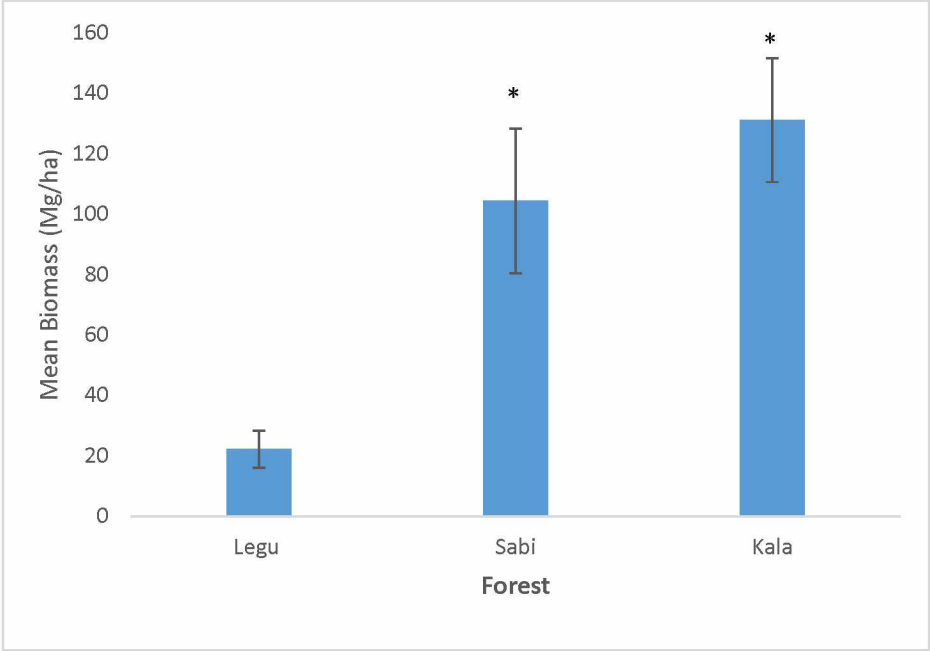

Figure 3.6. *Mean above ground biomass (AGB) of trees with DBH > 5 cm of plots within the Legu, Sabi, and Kala community forests. Asterisks (*) indicate whether there is a significant difference between mean AGB in the Sabi and Kala Forests (which contain sacred sites) and the Legu Forest (which does not contain a sacred site). Error bars represent SEM.*

3.6 Discussion

These results indicate that community forests containing sacred sites (the Sabi and Kala Forests) in the town of Kaboli were less degraded and had a higher ecological value than a similar community forest (the Legu Forest) that did not contain a sacred site. The Sabi and Kala Forests had significantly higher percentages of tree cover within their historical boundaries than the Legu Forest. Additionally, the most frequently encountered species within the Sabi and Kala Forests were species associated with deciduous dry forests while the most frequently encountered species in the Legu Forest were introduced plantation species and species associated with savannah habitat. While the species richness in the Sabi Forest was not significantly higher than the Legu Forest, the Kala Forest did have significantly higher species richness. With respect to two other measures of biodiversity, the Shannon and Berger-Parker diversity indices, both the Sabi and Kala Forest were significantly higher than the Legu Forest. Average AGB was more than four times higher in both the Sabi and Kala Forests than in the Legu Forest.

These results align with those of previous studies which have suggested that sacred forests in West Africa act as important refuges for biodiversity (Decher 1997; Campbell 2004, 2005; Bosart et al. 2006; Kokou & Kokutse 2007; Kokou et al. 2008). Kokou et al. (2008) explain that sacred forests in Togo are generally composed of typical forest affinity species, host high levels of biodiversity, and provide habitat for numerous species found nowhere else in the country. The Kala and Sabi Forests are especially valuable for biodiversity conservation due to their large sizes. While the average size of sacred forests in Togo is 0.74 ha (Kokou et al. 2008), tree cover within the Sabi and Kala Forests covers areas of 242 and 499 ha, respectively. This advantage is particularly relevant for biodiversity conservation considering that dispersal limitations and lack of genetic diversity within small forest patches is one of the main limitations of the conservation value of sacred forests in the region (Decher 1997).

The biomass of the Sabi and Kala Forests is relatively high compared to the results of other studies in the region (Baccini et al. 2008; Carreiras et al. 2012; Sidzamba et al. 2016), suggesting that in addition to conserving biodiversity, sacred forests in Kaboli provide important local carbon sinks. Baccini et al. (2008) reports that closed deciduous forests across tropical Africa have an average AGB of 85 Mg/ha. Based on this measurement, the Sabi and Kala Forests, with an average AGB of 104 and 131 Mg/ha, fall well above average in terms of carbon storage. The Legu Forest, with a mean AGB of 22 Mg/ha was more similar to biomass measurements reported for more open deciduous woodland ecosystems (Baccini et al. 2008, Carreiras et al. 2012).

Authors have suggested that the strength of the sacred forest system comes from its relevance to the beliefs, traditions, and lifestyles of local communities (Kokou et al. 2008). Even today, the majority of people living near sacred forests respect the gods and ancestors living within them and fear the consequences of upsetting them (Campbell 2004, 2005; Kokou et al. 2005). Residents of the Sabi family in Kaboli explain that their forest is protected by several different gods, and that these gods can cause problems for people who fail to follow community-imposed regulations regarding the sustainable use of natural resources within them. For example, somebody who has harvested a tree within the forest without permission could become lost in the forest and unable to escape unless aided by a member of the Sabi family.

Despite this protection, sacred forests across Togo have suffered high levels of deforestation and degradation. For example, of nine sacred forests mapped in southern Togo in

1998, seven had decreased in size when revisited in 2006. Of those seven, three lost over half of their area (Kokou & Kokutse 2007). The Sabi and Kala Forests are not exceptions to this rule. While they remain significantly more intact than the Legu Forest, both have experienced deforestation and degradation. Members of the Sabi family group explain that conservation of their forest has become increasingly difficult in recent years, saying that lack of respect for the forest has caused several of the gods who previously protected it to move elsewhere.

These results lend support to previous studies which suggest that forests used as sacred forests by local communities may be conserved more successfully than similar forests that do not have spiritual value, and both academic researchers and residents of Kaboli have indicated that the breakdown of traditional social and religious systems presents a significant threat to these ecosystems. Considering this, the most effective way to encourage the preservation of remnant forest patches in Togo may be to focus on the preservation of traditional cultural practices. For example, when local religious structures are intact, taboos prohibiting unsustainable forest uses are often particularly effective forms of regulation because the gods enforcing these taboos are powerful and well-respected by community members.

Previous research in this area suggests the need for the Togolese government to develop more sustainable forest management practices (Kokou et al. 2008), and the Sabi family is hoping that new connections with the state forest department will increase their ability to protect their forest. While the ability of the state to draft and enforce sustainable forest management practices is clearly important, it may be equally important for governmental and academic actors to focus on the valorization of traditional knowledge systems and ways of life.

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4. Social Factors Associated with the Conservation of Sacred Forests in Kaboli, Togo[1]

4.1 Abstract

High rates of deforestation present a threat to ecosystems around the world. In Togo, because a large portion of remaining forest cover exists within sacred forests, it is particularly important to consider the social factors associated with the conservation of these forests. This study focuses on the conservation of three communally managed forests in Kaboli, Togo, including two sacred forests and one non-sacred community forest. Focus group interviews were carried out with the elders, men, and women of the four communities involved in this study. Participants shared information regarding threats posed to their forests and the management, use, and values of their forests. Residents of Kaboli identified population growth, westernization, local land use conflicts, lack of financial means, and overly restrictive state management practices as factors leading to forest degradation. In addition, it was found that forests that were used and valued for traditional social and cultural purposes, as opposed to forest products or ecosystem services, were conserved most effectively. This suggests that conservation activity in the area should focus on the maintenance of traditional cultural and religious connections of community members to their forests.

4.2 Introduction

Deforestation is a pressing global concern contributing to climate change and loss of the world's biodiversity. Since 1990, the world has lost 129 million hectares of forest, or one percent of the world's total forested area. While rates of deforestation are decreasing, this trend continues to pose threats to ecosystems throughout the world, and particularly in Africa and South America where losses are greatest (FAO 2015). Deforestation has been particularly extensive in Togo and other West African countries. According to the United Nations Food and Agriculture Organization (FAO), Togo has one of the highest rates of deforestation in the world and lost an average of 5 percent of its forest cover each year between 1990 and 2015 (FAO

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2015). In 2015, the total area of forest in Togo was only 188,000 hectares, or 3.3 percent of the country's surface area (Sama et al. 2015).

Remaining forests in Togo continue to be threatened. The majority of land in Togo is used for agriculture. In addition to land cleared directly for farming, bush fires that are generally associated with agriculture but do occur to naturally to a much lesser extent, also cause forest degradation (Kokou et al. 2008). Researchers working in the region suggest these factors are exacerbated by cultural changes such as the loss of local religion that has accompanied the introduction of Islam and Christianity and changes to the education system (Campbell 2004, 2005, Kokou et al. 2008).

Previous research suggests that communally-managed sacred forests in West Africa conserve endangered ecosystem types and provide important refuges for biodiversity (Decher 1997; Campbell 2005; Bosart et al. 2006; Kokou et al. 2008; Sanou et al 2013). For example, sacred forests have been found to house native communities of vegetation that have been destroyed in surrounding areas, contain forests with a larger average stem diameter and higher canopy than nearby woodlots, and provide important habitat for animal species including small mammals and butterflies (Decher 1997; Campbell 2005; Bosart et al. 2006; Sanou et al. 2013). In Chapter 3, we found that sacred forests in Kaboli had greater canopy cover within historic forest boundaries, vegetation communities that more closely resembled endangered dry forest ecosystems, and higher biodiversity and biomass of tree species than an otherwise similar community forest that did not contain a sacred site.

Despite clear evidence of the ecological importance of sacred forests, very little work has been done to address the social or cultural mechanisms by which they participate in forest conservation. Therefore, in this chapter, we focus on the social factors associated with the successful conservation of sacred forests in Kaboli, Togo.

4.3 Study Site

Kaboli is a town located in the Centrale region of Togo in West Africa. The town had a population of approximately 21,600 people in 2010 (Togo Data Portal 2010) and functions as a regional center where people from surrounding villages can visit the market or health center and attend school. The area surrounding the town is largely deforested, but remnant forest patches can be classified as deciduous dry forest (Kokou et al. 2008).

The town of Kaboli is made up of nine quartiers. While the word "quartier" can be translated directly to French to mean "neighborhood," in Kaboli it is used to refer to extended family groups with a shared history. Each quartier owns certain areas of land within the town of Kaboli itself where most members of the quartier build their homes along with areas of land outside of town that are used mainly for agriculture. Each quartier's land also includes one or more community forests. In many cases, these forests are sacred forests and represent the historical locations of abandoned villages or are the homes of local gods. Some of these forests have been relatively well preserved while others are now little more than arbitrary boundaries.

In this study, we focus again on the three forests whose ecological characteristics were compared in chapter 3. These include forests belonging to the Atafa, Adobia, and Kala quartiers, or to smaller sub-groups within those quartiers. The Legu forest belongs to the Atafa quartier, the Sabi forest belongs to the Sabi family of the Adobia quartier, and the Kala forest belongs to the Kala quartier (Fig. 4.1). All three of these forests were used 200-300 years ago by early residents of as village sites because the dense forest allowed them to defend themselves from raids carried out by the neighboring Dahomey Empire, which was an important player in the trans-Atlantic slave trade (Manning 1982). The Atafa, Sabi, and Kala family groups who own the community forests today are the descendants of the people who once inhabited these three forests.

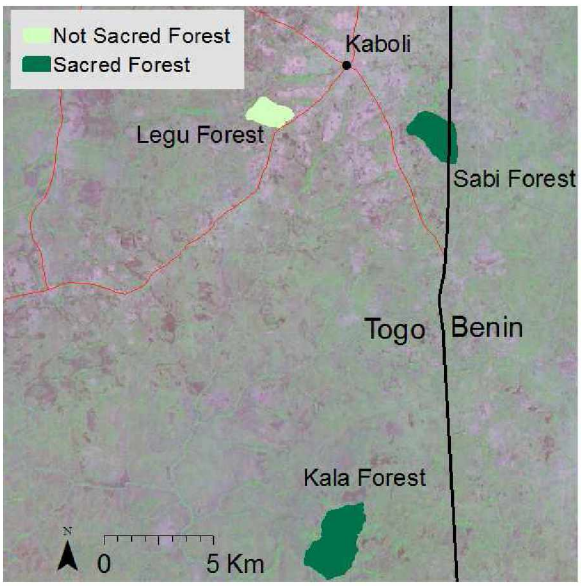

Fig 4.1 *Map of the Legu, Sabi, and Kala community forests. Green lines represent forest boundaries, red lines represent major roads, and black lines represent the Togo-Benin border*

Remnants of these times can still be seen in the forests. Each has a long ditch encircling it. In the past, these ditches were traps used to catch enemies entering the forests. Community members said that these ditches had been dug and then covered with grass or bushes so that they could not be seen. People who did not know specifically where they were and how to get around them would therefore fall through and be trapped in them. Members of the Atafa quartier explained that there were also smaller holes that could be seen in the center of the forest. These had been hiding places for the women and children during times of war. Holes were dug and *acacia spp.* briar bushes were planted around them. Any enemies in search of people to kidnap would see the briar bushes but would not know that anything was hidden inside of them.

The Sabi and Kala community forests function as sacred forests while the Legu Forest does not. We determined this based on conversations that occurred during focus group interviews with members of the Atafa, Sabi, and Kala family groups. Family members were asked whether their community forests were used as sites for the practice of traditional religion. Members of the Sabi and Kala quartiers explained that there were sacred sites within their forests, saying that these sacred places were located at the sites of old villages.

The Kala quartier explained that sacred sites could be identified by the presence of certain species of trees such as Baobabs that were planted by the ancestors. The ancestors, they said, were still present in these sites. Whenever the members of the Kala quartier hold an event such as a festival or a funeral in Kaboli, those actions are also carried out by the ancestors in the forest. For example, the ancestors might be heard drumming in the forest during a festival or crying during a funeral.

The Sabi quartier explained the presence of guardians within their forests. These guardians are specific animals or plants protecting the forest. Members of the Sabi quartier said that guardians within their community forest included chickens, pigeons and a huge boa constrictor. Unfortunately, they explained that due to pressures from hunting and logging, the chickens and pigeons had been chased away. However, they said that the boa constrictor had a particularly powerful spirit and therefore had not been chased away; he could still be seen at times in the forest.

Members of the Atafa family reported that no shrines exist within their forest and that it has never been used as a religious site. Considering that it shares a very similar history with the Kala and Sabi forests as a location in which the family's ancestors lived, it is interesting that the

Legu forest is not used as a sacred forest by members of the Atafa quartier. We do not know why this is the case. One possibility is that members of the Atafa quartier may not actually be descendants of the ancestors who lived in the Legu forest. While most focus groups from Atafa did state that the people who lived in the Legu forest were their ancestors, certain participants also explained that the people who lived in the Legu forest were actually a different group of people who moved away before the Atafa quartier arrived in Kaboli. Another important consideration is that the Atafa quartier, as the quartier that founded the town of Kaboli, has more land than many of the other quartiers and owns more than one community forest. While the Legu forest does not contain any sacred sites, there are sacred sites located within some of Atafa's other community forests.

4.4 Methods

Focus groups of three to fifteen participants were conducted with members of each of the three quartiers whose forests are being examined in the study. Within each quartier, focus groups were carried out with women, men, female elders, and male elders of the quartier. A distribution of interviews between participants of different ages and genders was used to provide a more accurate representation of the perspectives and experiences of the community as a whole. Discussions with each of these groups were held separately to ensure that differences in status did not prevent certain groups from voicing their opinions (Kokou et al. 2008; Ormsby 2011). Focus groups were carried out between 10 October 2015 and 31 July 2016. During this time we interviewed a total of 13 focus groups with 77 participants from the Atafa, Sabi, and Kala quartiers.

Study participants were selected based on their standing in the community. We chose participants who were both active and well-respected within the community and also aimed for community members with a strong knowledge of the forests whenever possible. In most cases, participants were active members of their quartier's young people's group, women's group, or wise people's (elder's) group. Within each quartier, local counterparts assisted with participant recruitment. Community members who assisted with participant recruitment and interview scheduling included quartier chiefs, and leaders within the young people's, women's, and wise people's groups of Atafa, Sabi, and Kala.

An interview guide was used during these discussions to direct conversation, but was not strictly followed (Ormsby 2011). Topics addressed during the interviews included consumptive and non-consumptive uses and values of community forests, local management systems, potential threats to forests, strategies taken to address these threats, and ideas for future conservation of community forests. Interviews were conducted in a combination of French and Kaboli language. When interviews were conducted in Kaboli, a translator was used. Translators were often members of the same demographic group being interviewed. Female translators were used during interviews with female participants whenever possible.

All interviews were recorded on a voice recorder, transcribed in French, and then translated to English. Next, a combination of coding methods was used to categorize and analyze the data (Saldaña 2013).

First, structural coding was used to break the interview transcripts into eight different categories based on topic of discussion. The eight structural codes used were "forest description," "forest use," "forest management," "threats," "conservation methods," "imagining future," "importance of conservation," and "history." In many cases, these codes were overlapping; single lines of text had up to four structural codes. In addition to being divided into structural codes, each line of data was also given an initial code. Initial codes were developed as they were applied; the word or phrase that seemed to most accurately describe the information presented in a line of text was used (Saldaña 2013).

During the second cycle of coding, information was divided based on its structural code(s). Then, secondary codes were applied based on the initial codes and the information in the text so that a separate set of more detailed codes was developed for data falling within each structural code category (Saldaña 2013). Secondary codes were chosen specifically to shed light on the research questions being addressed. While no structural code category was created to specifically categorize information relating to spiritual or religious aspects of community forests, the importance of spiritual and religious forest uses became clear as secondary codes were developed.

After lists of secondary codes had been generated, they were used to compare the conservation status, use, management, threats, and ways in which forests were valued between each of the three quartiers. Patterns regarding which codes were most often associated with

particular quartiers were developed and used to identify similarities and differences between the three communities.

These codes were used to compare the ways in which sacred forests and other non-sacred community forests were used and valued by residents of Kaboli. Uses and values of community forests described by study participants were divided into four categories: agriculture/herding, forest products, ecosystem services, and cultural/spiritual. All secondary codes relating to forest uses and values were placed into one of these four categories. Each quartier was then given a "use and value score" for each category based on the number of different uses and values identified and the number of focus groups within each quartier that mentioned each forest use or value.

A similar process was used to compare the actions that were taken to conserve sacred forests and other non-sacred community forests in and around Kaboli. Based on the secondary codes developed, three main conservation actors were identified. These included community members, state foresters, and the gods of the forests. Each group of conservation actors was given a "conservation actions score" for each forest based on the number of different conservation actions participants said they had taken and the number of focus groups within each quartier that identified each conservation actor as taking a particular conservation action.

4.5 Results

4.5.1. Conservation Challenges

Participants from all three quartiers considered in this study faced a variety of challenges in attempting to conserve their forests. We will first describe the threats to forest conservation identified by community members before discussing the ways in which community members are able to respond to these threats in order to conserve sacred forests and other non-sacred community forests.

In the most direct sense, degradation of community forests is the result of unsustainable use by quartier members and other users. Participants listed agriculture, gardening, charcoal production, grazing of cattle, logging, hunting, unsustainable fishing, open defecation, and disrespectful academic research as activities that have led to deforestation.

Most of these unsustainable uses are clear and fairly straightforward, but it is worth taking a moment to comment on the role of scientific research in the destruction of cultural sites

as it is a somewhat different process than the other factors listed. Members of the Sabi collective listed scientific research carried out without their consent as a threat to the sacred sites that exist within their forest. They said that in the past researchers have been interested in studying these sacred sites and have entered the forest through Benin in order to do so without asking the permission of the Sabi collective. They explained these researchers stole some of their sacred objects saying, "There are many things there at the place. Since people do research, they go there. They take them one by one. They steal… Others that do research about rocks like that or about the ancient idols. They take them away. They look to know the age of the rock."

One of the most commonly listed ultimate causes of forest degradation by participants was population growth. Community members explained that the town of Kaboli has been expanding rapidly in recent years. As the livelihoods of most residents of Kaboli are based largely on subsistence agriculture, an expanding population means a need for more farm land. Additionally, a larger population places more pressure on forest resources such as lumber and wildlife populations. Participants explained that the high birth rate in Kaboli contributes to this problem and several people specifically cited polygamy as a contributing factor. They also explained that houses are more spaced out now than they were in the past; people have bigger yards. This change has been made to improve fire safety within the town.

According to participants, interactions between local communities and the national government have also contributed to forest degradation. Members of the Kala quartier explained that the state government has contributed to the growing human population surrounding their forest by forcing people to move out of the nearby Abdulai State Forest. Several groups of Kabye people from Northern Togo had moved into the state forest in order to make use of the fertile soil there for subsistence agriculture. When these people were forced out of the national forest, they moved into the Kala forest. Kala, having fewer resources available for forest protection than the national government, has not been able to prevent these people from deforesting certain portions of the Kala Forest for agriculture.

Additionally, community members explain that strict no-use policies regarding wood and wildlife resources that were in place in the 1980's backfired during the civil unrest that occurred in the 1990's. During this period of unrest, community members interpreted new ideas of democracy to mean that citizens of Togo should have free access to natural resources. In an attempt to seek revenge on a government that had previously prohibited all hunting or logging,

many people utilized these resources as much as possible, depleting healthy wildlife populations and deforesting large areas of land over the course of just a few years. One member of the Atafa quartier explained that, "There was a time when democracy arrived and people all became independent. They didn't respect order anymore. There were people who killed fifty deer in a day. A single person."

This poor implementation of democracy has not been the only way in which westernization has contributed to the degradation of Kaboli's community forests. The replacement of local religion with Christianity and Islam has also played a significant role. The presence of sacred sites within community forests is one of the main factors that has allowed for their successful conservation. A loss of respect for these sacred sites can quickly lead to forest degradation. Members of the Sabi quartier explained that forest degradation has come hand-in-hand with the degradation of local religious structures saying, "The noise of the chainsaw, it scares away the gods. Since the woodcutters go into the forest, they scare away the gods and they don't have strength for the forest anymore… They left. They went somewhere else."

Study participants also stated that the western system of education, which was introduced, and the desire for "progress" has led to reduced respect for elders within the community. The introduction of the cash economy has resulted in an increase in the commercial harvest of natural resources and also contributes to unsustainable use. Results of westernization earlier in the town's history include the transition of residents of Kaboli from a hunter-gatherer to an agricultural society and the establishment of the Togo-Benin border which has been the cause of significant land-use conflicts and deforestation within the Sabi Forest.

In addition to the effects of national-scale political changes, local politics has also played an important role in forest degradation according to community members. In several cases, contested rights to a certain portion of land has led to rapid depletion of resources on that land. For example, both the Atafa and Sabi quartiers state that the Legu Forest belongs to them. Before the Legu Forest was as deforested as it is now, this was a very contentious topic because both quartiers wanted access to the valuable timber wood available within the forest. After several years of conflict during which both local leadership structures and the Togolese court system judged the issue, the Atafa quartier decided to resolve the problem. They decided to simply harvest the wood in question and take the money rather than continue to fight over it with Sabi. Once the wood was harvested, the land was no longer valuable and the conflict became

much less important. A similar conflict is currently occurring within the Sabi forest as well. A portion of this forest falls on the other side of the Togo's national border in Benin. Therefore the residents of the town of Biguna, which is located on the other side of the border, argue that this portion of the forest belongs to them and have cleared most of it for agricultural use.

Finally, many community members listed a lack of economic opportunities as a factor contributing to the destruction of their forests. They explain that farming and natural resource harvesting are the only sources of money available to them. One member of the Kala quartier explained, "There aren't any government jobs here. Everyone works in agriculture. We go to school; we don't find a government job. Everyone has become a farmer. We work the land. That's why everyone goes in the forest now and destroys everything." Additionally, a lack of financial capital makes enforcement of regulations more difficult for those quartiers attempting to restrict the harvesting of resources within their forests.

4.5.2. Forest Uses and Values

When asked to describe the ways that community forests were used and the reasons that they were valued, several differences were observed between communities discussing sacred forests and those discussing other non-sacred community forests. Participants from the Atafa quartier, who were discussing the Legu Forest (not a sacred forest), mentioned agricultural uses of their community forests much more often than participants from the Sabi and Kala, who were discussing sacred forests. On the other hand, participants from the Sabi and Kala quartiers mentioned cultural/spiritual uses and values of forests much more often than participants from the Atafa quartier (Fig. 4.2). The uses and values of community forests identified by study participants can be seen in Table 4.1.

It is also important to note that while participants from all three quartiers discussed the importance of forest products and ecosystem services, forest product and ecosystem service scores did not vary between quartiers discussing sacred forests and those discussing non-sacred forests. Members from all three quartiers mentioned these forest values with approximately equal frequency. This suggests that while community members are aware of the importance of these uses, they do not play a main role in forest conservation.

Many of the uses discussed were carried out by quartier members themselves. However, there were also a variety of other groups of people making use of these three community forests.

In all four quartiers it was mentioned that people often come from other quartiers and other towns in order to use community forests. In the Legu and Kala Forests, Kabye immigrants in search of farm land are an important user group. In the Sabi Forest, residents of the town of Biguna in Benin are significant. Additionally, the Fulani, a nomadic cattle-herding people make use of all three forests.

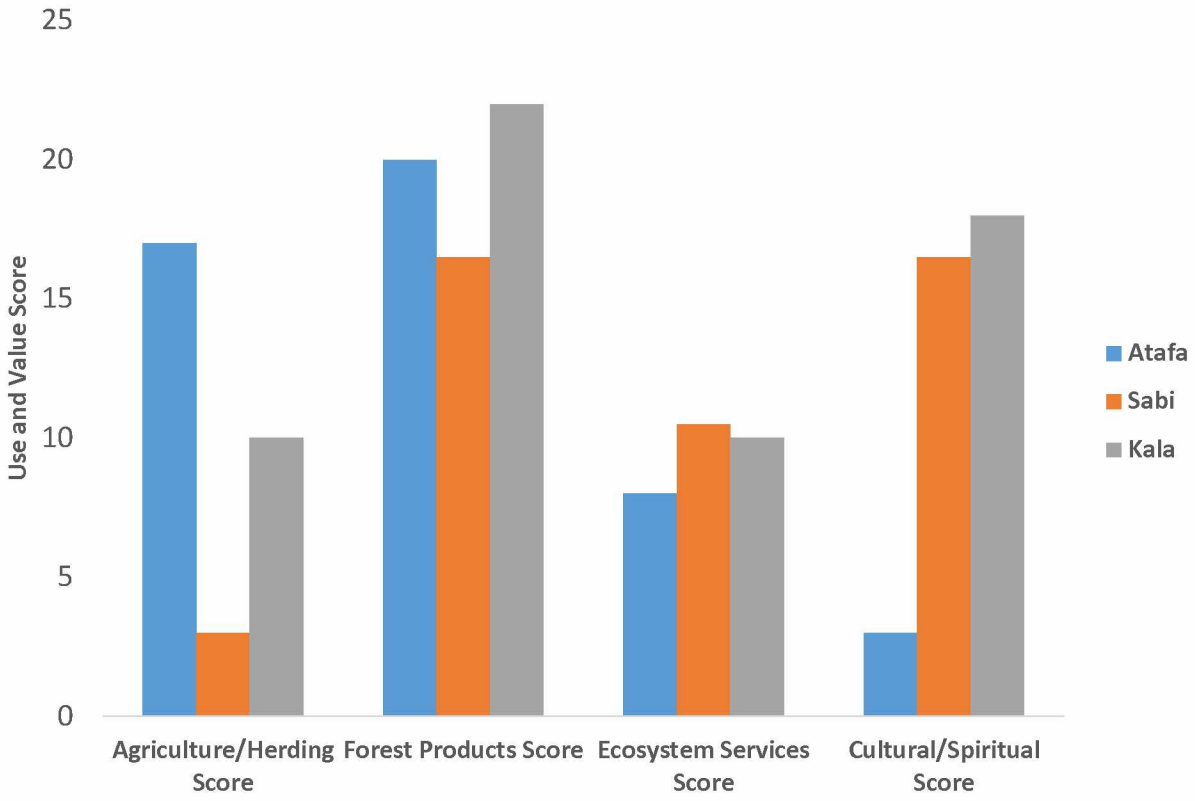

Figure 4.2. *Comparison of the number of times agriculture/herding, forest products, ecosystem services, and cultural/spiritual uses or values of forests were identified by each quartier. Each use or value identified by participants was listed and given a score for each quartier from one to six based on the number of interview groups from the quartier who mentioned it. Scores within each category were then totaled and adjusted based on the number of interviews conducted.*

Table 4.1. Forest Uses Identified by Members of the Atafa, Sabi and Kala Quartiers (in order of frequency mentioned)

Use/Value Category	Atafa	Sabi	Kala
Agriculture/Herding	Agriculture	Agriculture	Agriculture
	Gardening		Herding cattle
	Plantations		
	Herding cattle		
	Growing plantains		
	Growing palm nuts		
	Planting sauce leaves		
Forest Products	Harvesting wood	Harvesting wood	Harvesting wood
	Hunting	Medicinal plants	Hunting
	Making charcoal	Hunting	Medicinal plants
	Sauce leaves	Firewood	Collecting fruit
	Medicinal plants	Sauce leaves	Collecting ginger
	Firewood		
Ecosystem Services	Attracts rain	Attracts rain	Attracts rain
	Maintains biodiversity	Provides windbreak	Provides windbreak
	Provides wildlife habitat	Maintains biodiversity	Maintains biodiversity
		Regulates climate	
Cultural/Spiritual	Connecting past and future	Ceremonies	Connecting past and future
	Health and well-being	Connecting past and future	Ceremonies
	Traditional knowledge	Health and well-being	Prayer
		Traditions	Remembering traditions
		Connecting with ancestors	Traditional knowledge
		Remembering traditions	
		Conducting research	

4.5.2. Conservation Efforts

Study participants identified a variety of different actors who have been involved in the conservation of community forests. Actors identified by more than one quartier included residents of the quartier, forest gods, and the state government. Additionally, development actors such as non-governmental organizations and myself as a Peace Corps volunteer along with individual farmers were listed as conservation actors by Atafa. When conservation attempts of

these different actors within the three quartiers were scored based on amount of activity, residents of Sabi were found to be working most actively to conserve their forest. State actors were also found to be participating in conservation efforts in Atafa and Sabi while forest gods were found to be participating in conservation efforts in Kala (Fig. 4.3).

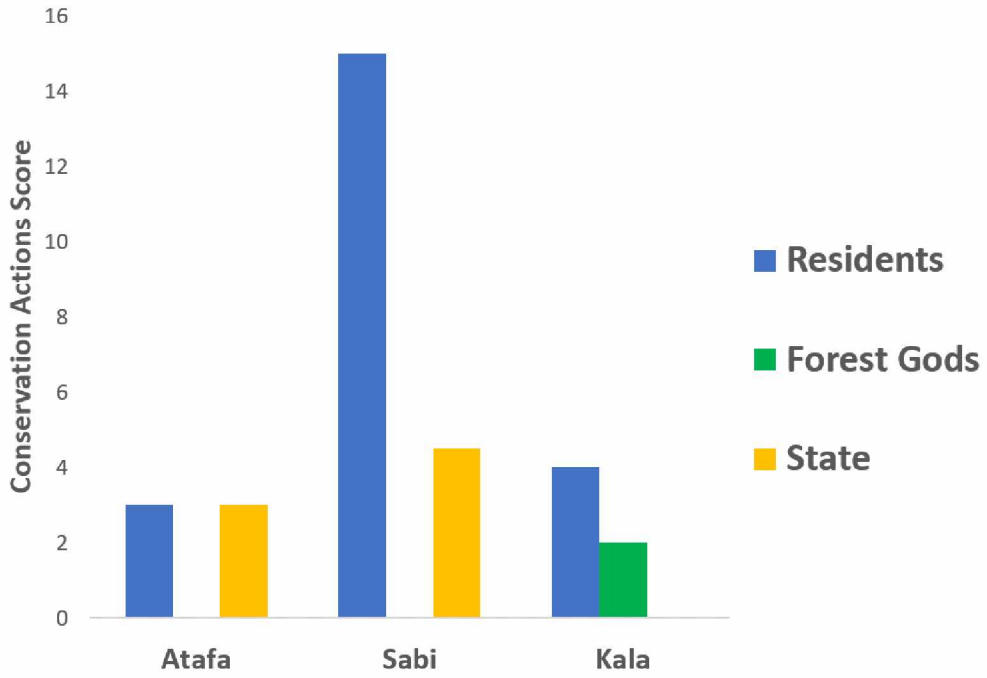

Figure 4.3. *Comparison of the number of conservation actions taken by community members, by forest gods, and by state foresters that were identified by study participants from the Atafa, Sabi, and Kala quartiers. Each conservation action carried out by one of these groups that was identified by participants was listed and given a score from one to six based on the number of interview groups from the quartier who mentioned it. Scores within each category were totaled and adjusted based on the number of interviews conducted.*

The Sabi collective was actively working to create a more effective system for the conservation of the Sabi Forest at the time that these surveys were carried out. They explained that they had been struggling with attempts to prevent unsustainable harvesting of timber products within the forest in recent years. They were monitoring use of the forest and confronting anybody who was found harvesting wood within the forest. If they found somebody harvesting wood, they would confiscate the person's chainsaw in order to discourage them from doing so again. In recent years, the collective had also tried to create a buffer zone of teak surrounding the forest in the hopes that this would provide wood and prevent logging within the

forest itself. However, this attempt was unsuccessful as the saplings were pulled up by neighbors who had hoped to farm the area where the teak was planted and were angry about the attempt to restrict access to the land.

Study participants from the Kala quartier noted fewer attempts than Sabi to conserve their forest. They emphasized that while they wanted to conserve their forests they did not have the "resources" necessary to do so. The only conservation action they said that they had taken was to attempt to restrict unsustainable use of forest products. However, it is important to note that these results may not be representative of the quartier's actual attempts to conserve the forest. The Kala quartier was under the impression that I had money available to fund forest conservation projects and may have been understating their capacity to conserve their forest in order to convince me of their need for outside aid.

Conservation actions taken by the Atafa quartier were also minimal. The only conservation activity that they identified was planting trees in the forest. In most cases, the tree planting that they were referring to was occurring in plantations.

In addition to conservation activities carried out by quartiers, residents of Kala noted that forest gods also participate in conservation of forests. Residents of Kala explained that the forests have the ability to impose sanctions on people who are using them inappropriately. For example, members of the Kala quartier explained that the forest could cause somebody who had entered it with malicious purposes to become lost and unable to leave the forest.

It is important to note that while members of the Sabi quartier did not identify forest gods as participating in forest conservation in the present, they did explain that gods played an important role in forest conservation in the past. Quartier members explained that in the past they could request that gods prevent activity such as hunting and logging within the forest and they would do so. In that time, the consequence of logging or hunting within the forest without permission was often death at the hands of the gods. However, study participants stated that in recent years this system has been removed. The problem, they explained, is that many people are now either unaware of these taboos or do not believe in them. The result was that these unknowing people would sometimes enter the forest without realizing the consequences. Often, they did not mean any harm and were simply lost. However, due to the taboos, they would be killed by the gods of the forest. The quartier decided that this system was posing a danger to the well-being of people living locally and therefore removed the taboo. Additionally, they stated

that some of the gods have lost power in recent years and have therefore been scared away by the noise caused by chainsaws and hunting rifles in the forest. Due to these changes, the quartier is currently in the process of replacing this traditional management system with a new structure, potentially including the classification of the forest and collaboration with state agencies.

Participants from the Atafa quartier did not list forest gods as conservation actors in either the past or the present.

The Atafa and Sabi quartiers noted that the state government also participated in the conservation of their forests. Participants from Atafa said that the state encouraged them to plant trees and set regulations restricting the harvest of natural resources. As mentioned previously, state employees including foresters and law enforcement officers participated in the enforcement of regulations within the Sabi forest at the request of members of the collective.

4.6 Discussion

While members of all three quartiers described significant challenges in protecting their forests, the ability of each quartier to respond effectively to these challenges varied. The Atafa quartier, with the only non-sacred community forest, had been least effective in the conservation of their forest with 62 percent of its original area remaining while the Sabi and Kala quartiers, whose community forests were sacred, had 88 and 98 percent remaining forest cover, respectively. Trends observed in the data collected suggest that differences in success of forest conservation are related to the ways in which these forests are used and valued by the quartiers responsible for them.

Agricultural use seems to be most associated with non-sacred community forests and least compatible with forest conservation. This is not surprising; it is widely recognized that agriculture poses a significant threat to tropical forests, particularly given the world's growing population, globalization, and climate change (Lambin et al. 2003; Klink & Machado 2005; Lambin & Meyfroidt 2011). The most important use of the Atafa quartier's Legu Forest was agriculture. Participants from Atafa listed agricultural uses more frequently and listed more types of agricultural uses than any other quartier. Much of the land falling within the historic boundaries of the Legu forest is currently being used for agriculture. While agriculture also occurs in the Sabi forest and the Kala forest, this is a secondary activity to forest product uses such as hunting, logging and the harvest of non-timber forest products (NTFP's). Social and

cultural values also play an equal or more significant role. Agriculture that has occurred within these two forests is the main cause of reduction in forest cover within them.

The Atafa quartier had a somewhat different land management system than the other two quartiers, which was likely the result of their highly agricultural use of historic forest land. The Kala, Sabi, and Kpomossaro quartiers each explained that their entire community forest belonged to the entire quartier. Authority figures including quartier chiefs and elders were responsible for decision-making regarding the forests, and while regulations and taboos differed within each forest, all quartier members had equal access to the entire forest. However, while the Legu forest was technically communal land (like all other land belonging to the quartier), in practicality individual families had rights to portions of land utilized by their families and often cleared by their fathers or grandfathers. While elders explained that individuals farming in the Legu forest should ask the quartier's permission before making land use changes within their plots, younger people were sometimes unaware of this requirement and often did not follow it. It seems that in Kaboli sacred forests that are entirely communally managed may be more effectively conserved than non-sacred forests that are largely managed by individuals with access to plots within them.

The results of this study also indicate that spiritual and cultural uses and values of community forests were associated with sacred forests and most influential in successful forest conservation. The number of times that social and cultural forest uses were listed by focus group participants corresponded to the effectiveness of forest conservation. Study participants from the Kala and Sabi quartiers listed more cultural and spiritual uses and values of sacred forests than study participants from the Atafa quartier.

One possible explanation for higher levels of conservation success within sacred forests is that gods are able to provide more consistent and severe enforcement of regulations or taboos surrounding forest use than community members or state foresters. Participants from the Kala and Sabi quartiers described the way in which local gods were able to participate in forest conservation efforts through punishing those who fail to follow taboos or regulations regarding forest use. Possible consequences of unsustainable use may include getting lost in the forest, becoming frozen in place, or being killed. These consequences are much more severe than those that can be imposed by the quartier, or the local police force who can only confiscate equipment and sometimes charge a fine for unauthorized use. These results align well with those of previous studies that have described the ways in which enforcement of forest conservation by

gods can be more effective than enforcement by communities or governmental entities (Campbell 2005, Kokou et al. 2008).

Another possible explanation for the greater conservation success observed in sacred forests is that unlike forests that are valued for ecosystem services or forest products, the resources provided by sacred forests are not replaceable. For example, several participants from the Atafa quartier stated that forests are important because they attract rain. However, they explained that in their opinion, it would be a better idea to replace the Legu forest with plantations because plantations would also attract the rain and simultaneously provide an additional source of income. Similarly, when asked whether forest conservation was important, female elders from the Atafa quartier explained that forests are important because they provide a variety of resources such as firewood and traditional medicine. However, they explained that "there are always more forests" and that it's not a big problem if forests near the town are cut down because the community can simply use forests that are farther away to meet their needs if that happens. In both of these examples, members of the Atafa quartier suggest the possibility of replacing the Legu forest with other sources of resources. However, the resources provided by sacred forests such as the Kala and Sabi forests cannot be replaced in this way. The Kala and Sabi forest represent the homes of the ancestors and contain shrines to local gods. If these forests were lost, it would not be possible to find a new home for the ancestors or a new location to make sacrifices to those gods.

While study participants also listed a variety of values related to the harvest of forest products and ecosystem services, social/cultural values were the only ones that showed a relationship with the success of forest conservation. The ways in which community members valued forests for their forest products and ecosystem services seemed to be unrelated to conservation success.

In recent years, several authors have suggested that sacred forests should be incorporated into national systems of protected areas (Decher 1997; Bosart et al. 2006). Kokou et al. (2008) argue for the importance of developing a national framework for sustainable forest management. The results of this study indicate some community groups are also concluding that it is becoming necessary to replace traditional forest management structures with newer alternatives. The Sabi quartier is very aware of the weakening of their traditional religious system and are currently in

the process of registering their forest with the state in the hope that state protection may be able to make up for reduced protection by forest gods.

The development of best practices for conservation on a national scale and the incorporation of new technologies into sustainable management practices are clearly an important component of forest conservation. However, the results of this study indicate that replacing traditional structures of forest conservation with state protection may be inadequate. Conservation attempts carried out by the state or development agencies often focus on economic uses and values of forests while it is clear that in Kaboli traditional social and cultural uses and values of forests are most important in their conservation. Therefore, we recommend that residents of Kaboli and other Togolese communities focus their efforts on maintaining traditional management structures and their communities' social and cultural connections with their forests.

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Chapter 5. Effects of the West on Human-Forest Interactions and Identity in Kaboli, Togo[1]

5.1 Abstract

Throughout the world, westernization has had dramatic effects on both the cultural traditions and identities of various groups of people and their relationships with local natural resources. In many cases, the introduction of proselytizing religions and ideologies has led to the destruction of environmentally and culturally important natural resources. This study focuses on the effects of European and American actions on the relationships between forests and people in Kaboli, Togo. A combination of participant-observation and focus groups were used to gain an understanding of the uses, values, and conservation of community forests belonging to four different family groups. We found that since colonization, rapid religious, political, social, and economic changes are contributing to the degradation of sacred forests.

5.2 Introduction

In West Africa, forests play a particularly important role in social systems by acting as sacred forests in which human populations pray, hold ceremonies, and connect with ancestors (Dugast 2006; Kokou et al. 2008; Fournier 2011).

The majority of previous research on sacred forests has focused on ecological aspects and their ability to contribute to the conservation of biodiversity (Khiewtam and Ramakrishran 1993; Parthasarathy and Karthihayan 1997; Upadhaya et al. 2003; Bhagwat et al. 2005). A few studies have used methods in the social sciences to explore the ways in which sacred forests contribute to local culture and livelihoods, and address the effects of traditional community-based management systems on the maintenance of these forests (Debal and Malhotra 1997; Jaiswal 2010; Negi 2010). Several studies combine ecological and social methods in order to gain a more complete understanding of the ability of sacred forests to contribute to the conservation of both culture and biodiversity, and measures that are needed to ensure their long-term sustainability (Chandrashekara and Sankar 1998; Khumbongmayuma et al. 2005).

Fewer studies have examined the mechanisms by which human relationships with sacred forests are shaped. One factor that has had particularly strong effects on the ways in which communities around the world interact with sacred forests and other traditional communally

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managed forests has been westernization. Several studies have addressed the idea that westernization has led to degradation of community forests through the loss of traditional knowledge and the breakdown of traditional spiritual and religious systems (Campbell 2004, 2005; Murphy et al. 2016). However, more interdisciplinary work is needed to help create an understanding of the ways in which westernization has interacted with community forest management in order to conserve these increasingly rare pockets of biodiversity that are important to both the ecology and the people of the area.

This study focuses on the effects of European and American activity on the interactions between community members and local forests in Kaboli, Togo. Particular attention is paid to the ways in which changes in relationships between forests and people have affected forest conservation and family identity in Kaboli.

5.3 Study Site

Kaboli is a town located in the Centrale region of Togo in West Africa. The town has a population of approximately 21,600 people (Togo Data Portal 2010) and functions as a regional center where people from surrounding villages can visit the market or health center and attend school. The area surrounding the town is largely deforested, but remnant forest patches can be classified as deciduous or semi-deciduous dry forest (Kokou et al. 2008).

The town of Kaboli is made up of nine quartiers. While the word "quartier" can be translated directly to french to mean "neighborhood," in Kaboli it is used to refer to extended family groups with a shared history. Each quartier owns certain areas of land within the town of Kaboli itself where most members of the quartier build their homes along with areas of land outside of town that are used mainly for agriculture. Each quartier's land also includes one or more community forests. In many cases, these forests are sacred forests and represent the historical locations of abandoned villages or are the homes of local gods. Some of these forests have been relatively well preserved while others are now little more than arbitrary boundaries.

In this study, I focused on four forests belonging to the Atafa, Adobia, Kala, and Kpomossaro quartiers, or to smaller sub-groups within those quartiers. The Legu forest belongs to the Atafa quartier, The Sabi forest belongs to the Sabi family of the Adobia quartier, The Kala forest belongs to the Kala quartier, and the Lamassou forest belongs to the Homogé family of the Kpomossaro quartier.

5.4 Methods

This research was conducted as part of a study focusing on the conservation of community forests in Kaboli. As it became clear that social processes related to westernization play an important role in shaping the relationships between forests and people in Kaboli, we decided to look more closely at these processes.

Focus groups of three to fifteen participants were conducted with members of each of the four quartiers whose forests are being examined in the study. Within each quartier, focus groups were carried out separately with women, men, female elders, and male elders of the quartier. A distribution of interviews between participants of different ages and genders was used to provide a more accurate representation of the perspectives and experiences of the community as a whole. Discussions with each of these groups were held separately to ensure that differences in status did not prevent certain groups from voicing their opinions (Kokou et al. 2008; Ormsby 2011). Focus groups were conducted between 10 October 2015 and 31 July 2016. During this time, a total of 19 focus groups were carried out with 107 participants from Atafa, Sabi, Kala, and Kpomossaro.

Study participants were selected based on their standing within the community. We chose participants who were both active and well-respected within the community and also aimed for community members with a strong knowledge of the forests whenever possible. In most cases, participants were active members of their quartier's young people's group, women's group, or wise people's (elders') group. Within each quartier, local counterparts assisted with participant recruitment. Community members who assisted with participant recruitment and interview scheduling included quartier chiefs, forest priests, and leaders within the young people's, women's, and wise people's groups of Atafa, Sabi, Kala, and Kpomossaro.

An interview guide was used during these discussions to direct conversation, but was not strictly followed (Ormsby 2011). Topics addressed during the interviews included consumptive and non-consumptive uses and values of community forests, local management systems, potential threats to forests, strategies taken to address these threats, and ideas for future conservation of community forests. Interviews were conducted in a combination of French and Kaboli language. When interviews were conducted in Kaboli, a translator was used. Translators were either chosen by myself or a community counterpart and were often members of the same

demographic group being interviewed. Female translators were used during interviews with female participants whenever possible.

All interviews were recorded on a voice recorder, transcribed in French, and then translated to English. Next, a combination of coding methods was used to categorize and analyze the data (Saldaña 2013).

First, structural coding was used to break the interview transcripts into eight different categories based on topic of discussion. The eight structural codes used were "forest description," "forest use," "forest management," "threats," "conservation methods," "imagining future," "importance of conservation," and "history." In many cases, these codes were overlapping; single lines of text had up to four structural codes. In addition to being divided into structural codes, each line of data was also given an initial code. Initial codes were developed as they were applied; the word or phrase that seemed to most accurately describe the information presented in a line of text was used (Saldaña 2013).

During the second cycle of coding, information was divided based on its structural code(s). Then, secondary codes were applied based on the initial codes and the information in the text so that a separate set of more detailed codes was developed for data falling within each structural code category (Saldaña 2013). Secondary codes were originally created to answer questions regarding forest conservation. Later, data related to the role of westernization in forest conservation and community identity was considered in more detail.

Focus groups were also supplemented with participant observation. I lived in Kaboli Togo working as a Peace Corps Volunteer from August 2014 to August 2016. Information gathered through discussion with friends and colleagues is also included in this paper.

5.5 Results and Discussion

Located near the border between present-day Togo and Benin, Kaboli was heavily influenced by both German and French colonization. According to Manning (1982), Kaboli was incorporated into French colonies when the Dahomey Empire was conquered in 1893 and then ceded to German Togoland in 1913. Togoland was then divided between the English and the French in 1914, and Kaboli became the property of French Togo (Cogneau and Moradi 2014). Residents of Kaboli describe a strong German influence in the town. In fact one of the town's quartiers is still referred to as "Djama," an altered pronunciation of the word "German."

According to residents of Kaboli, a group of German people involved in promoting new agricultural techniques lived in this neighborhood in colonial times and constructed several of the buildings currently existing there. Following Togo's independence in 1960, influences of westernization continued to impact the country through the spread of proselytizing religions (Christianity and Islam) and "development" efforts.

When they were asked to identify factors leading to the degradation of their community forests, study participants identified a variety of processes related to westernization including the introduction of democracy, western education systems, Islam and Christianity, a cash economy, an agricultural lifestyle, and arbitrary national borders (see figure 1). Forest degradation was found to be closely tied to social and cultural changes experienced during this time period.

Religious changes have had a particularly strong effect on the way that residents of Kaboli interact with traditional forests in recent years. Traditional religion in Kaboli is closely tied to the natural world. Ceremonies are often carried out in sacred forests which are the homes of both gods and ancestors. Additionally, certain plant and animal species hold particular spiritual importance. For example, community members explained that a sacred pool in the Homogé family's Lamassou Forest contains a population of catfish. It is believed that these catfish are connected to members of the family. Each member of the Homogé family is connected with a particular catfish in this pond. When a baby is born a new catfish will also be born and when an elder dies, his or her catfish swims out of the pond and dies on the shore three days later.

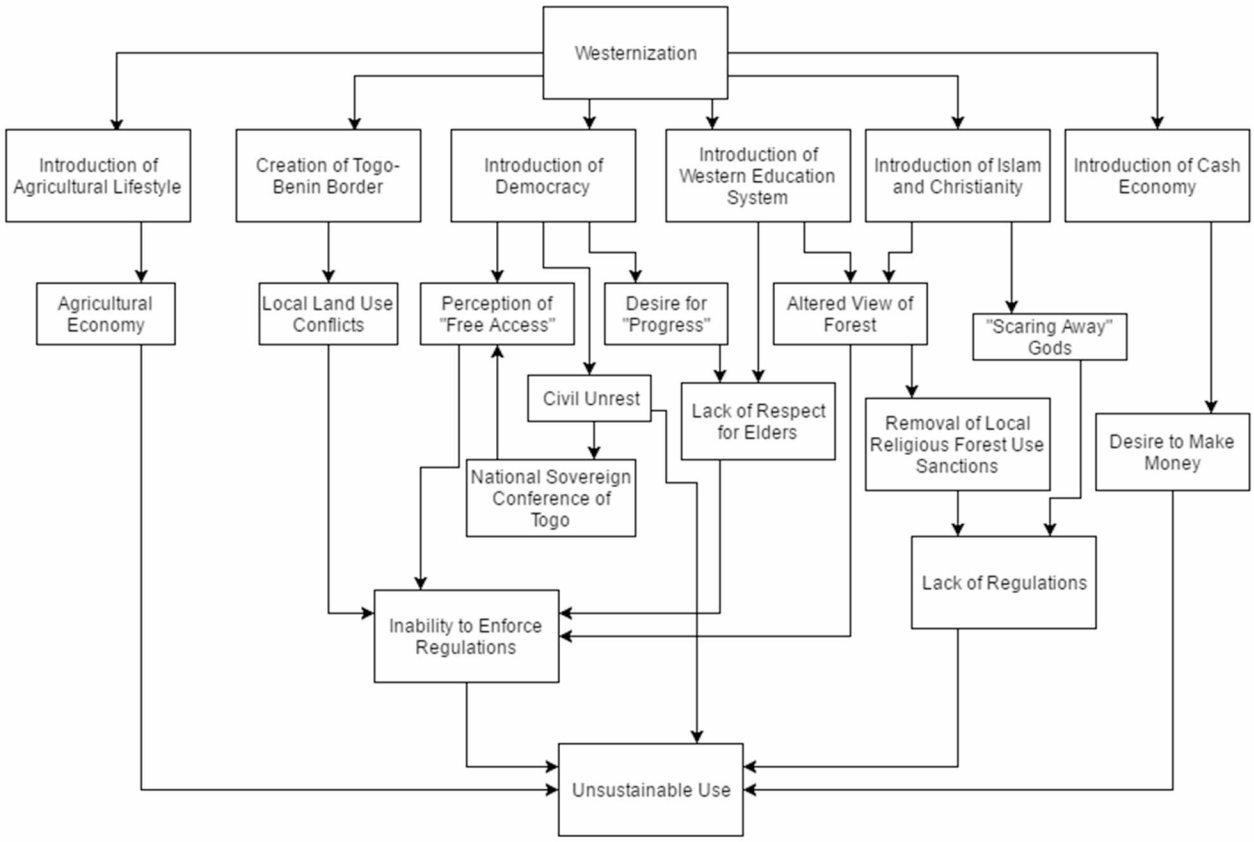

Figure 5.1. *Flow chart representing the ways in which westernization has led to unsustainable use of community forests in Kaboli, Togo. The mechanisms included are those which were identified by community members in focus group interviews.*

The introduction and growth of Islam and Christianity in Kaboli has led to a changed perception of these traditional beliefs. While nearly everybody in town continues to believe in the traditional "power," many consider its use to be both sinful and dangerous. Residents of the town explained that if you pray to a local god and make a sacrifice, you will receive what you have asked for. However, there will also be negative consequences that come with the fulfillment of your prayer. For example, a person who prays to the god for children will have many children, but they may die early in life. One member of the Atafa quartier explained that "It's real, but now we're Muslim. We don't do that anymore." Similar changes in belief have been observed in other parts of the continent as a result of the introduction of proselytizing religions. According to Murphy et al. (2016), practice of traditional religion in Monze, Zambia is often seen as "devil-worship." He explains that Christians in Monze often portray traditional

religion as "fetish." A similar attitude was expressed in Kaboli. In fact, shrines to local gods along with the gods themselves are commonly referred to as "fetishes."

A variety of studies have demonstrated that rapid social changes such as these resulting from introduced religions and other components of westernization can cause stress due to confusion of identity (Dasen 2000; McDade 2002). In Kaboli, community members often expressed a disconnection between pride for their past and their current views regarding traditional practices. For example, one member of the Atafa quartier explained that his great-grandfather could use "the power" to stop wars. If there was a conflict, he would simply say "anybody who kills somebody else will also die themselves" and the fighting would have to end. The power of Odin Amao, the founder of Kaboli, was also a strong source of pride for many community members. However, despite the clear pride of past use of traditional "power," the majority of community members consider its use sinful and dangerous in the present. It was often explained to me that the time for that sort of thing had ended. People stated that "now there is progress and we are Muslim (or Christian)." In some cases, traditional religion is practiced in secret. The forest priest of the Lamassou Forest explained that people sneaking into the forest during the night to carry out ceremonies without being seen by their neighbors has become a problem for him.

Loss of local religious structures has also contributed to the degradation of community forests in Kaboli. For example, local gods have historically played an important role in the conservation of the forest, enforcing regulations regarding sustainable use. In the past, those who entered the Sabi forest without permission could become lost in the forest or be killed by local gods. However, breakdowns in traditional belief systems have disrupted the ability of the forest to enforce sustainable management practices. This was explained to me by members of the Sabi family in two different ways. First, participants explained that the gods of the forest had "fled," saying that they were afraid of the sounds of chainsaws and hunting rifles and had therefore left to live somewhere else. Secondly, they explained that these regulations had been intentionally removed. As belief systems changed and human populations surrounding the forest grew, people became less aware of the regulations regarding the use of the forest and associated consequences. Therefore, elders of the Sabi family worried that an increasing number of people were being killed by the forest simply because they were not aware of these taboos. Not wanting

to cause the death of people who did not mean any harm, the Sabi family therefore decided to remove the taboos on the use of their forest.

In other cases, entire forests have been destroyed in a deliberate attempt to eliminate perceived threats associated with local religion. For example, elders of the Atafa quartier explained that in the past there was a sacred forest called the Egna forest located near town within the quartier. However, the forest was cut down and replaced with a mosque. Focus group participants explained that because the forest was so close to town it posed a threat to Muslim and Christian residents who could be pulled in to the practice of traditional religion.

These results support those of previous researchers who have suggested that the loss of traditional religious structures can result in the degradation or destruction of sacred forests (Campbell 2004, 2005, Kokou et al. 2008). For example, Campbell (2005) found that young people in villages within the coastal savannah of Ghana who are generally more skeptical of the power of sacred forests than older generations were more likely to violate taboos. The introduction of "new" religions such as Islam and Christianity was identified by community members as one of the main factors leading to this generational difference (Campbell 2005).

Unrest associated with the attempted introduction of "democracy" was another aspect of westernization that was noted several times by study participants as a factor contributing to forest degradation in Kaboli. Community members explained that much of the forest loss that can be seen today occurred during the political unrest of the 1990s. In 1991, the Democratic Opposition Front initiated a strike demanding that President Eyadema Gnassingbé hold elections and permit a national conference allowing for the discussion of political reforms. Protests and strikes initiated by Togolese citizens hoping for political reform continued through the early 1990s (Rennebohm 2011).

While this movement was unsuccessful in establishing a true democracy in Togo (the presidency was eventually passed from Eyadema Gnassingbé to his son Faure Gnassingbé), it did have a strong effect on the use of natural resources by Togolese citizens. Residents of Kaboli explained that policies regarding the use of natural resources prior to this event had been strictly regulated and harvesting of wood or meat was prohibited. Community members were very frustrated by these regulations but often were afraid to disobey them due to the possibility of legal consequences. Therefore, when civil unrest broke out in the 1990s and people across Togo began talking to each other about the ideas of "democracy" and fair governance, residents of

Kaboli reclaimed their rights to use natural resources. However, in an attempt to seek revenge on the state for its previous policies, community members overused resources. For example, one participant said that during the early 1990s there were hunters who could harvest up to twenty antelopes in a single day. One community member described the situation as a "misunderstanding of democracy."

Political instability in West Africa has been shown to prevent economic growth and create food security issues (Fosu 2002). Additionally, strict top-down governmental policies regarding the use of natural resources, such as those implemented in Togo before the early 1990's, have often been shown to result in local backlash and increased environmental degradation. National and international conservation efforts have often failed as a result of conflict that occurs when the use of natural resources that are relied on by local populations is restricted (Hough 1988; Boudreaux 2007; Scanlon and Kull 2009; Brooks et al. 2013). This study has demonstrated the ways in which the unsuccessful implementation of "democracy" or other governmental changes creating unrest can compound this problem by providing an opportunity for backlash by citizens who feel that they have not been respected or treated fairly in the past.

Changes to the agricultural system, the western education system, and a cash economy were less frequently identified by participants as factors contributing to the destruction of community forests in Kaboli. Participants explained that the intensification of agriculture and the introduction of a cash economy had made unsustainable resource harvesting a necessary part of securing a livelihood. It was noted that while in many cases community members valued their forests and wanted to protect them, they felt that their livelihoods were dependent on activities that were leading to forest destruction. Germany was particularly focused on the development of new agricultural techniques during their occupation of Togoland. They hoped to use the area to produce exports such as cotton that would minimize their reliance on other producers such as the United States (Zimmerman 2005).

The western education system was described by certain elders as a force involved in the erosion of respect for traditional knowledge. Participants explained that this change in education style had resulted in a lack of respect for elders among youth. One elder from Kpomossaro explained that youth were no longer willing to simply accept what they were told, but now had to try everything themselves and learn from their mistakes before understanding. Forced

participation in western education systems has been identified as destructive of traditional knowledge systems around the world. Many authors have discussed the importance of incorporating traditional ways in of knowing into classroom learning (Battiste et al. 2002; Barnhardt and Kawagley 2004).

5.6 Conclusion

Since colonization, western influence has had a strong impact on the interactions between people and their local forests in Kaboli, Togo. Processes of westernization including changes in religion, governance, education, and livelihood have degraded connections between communities and sacred forests. It seems clear that western influence cannot be separated from Togolese culture and will continue to affect the forests and people of Kaboli in coming years. Considering this, it is important for western researchers and development actors to think very carefully about the intended and unintended effects of their actions. Research and development often affects communities in ways that are unintended and unexpected. Therefore, respectful research should always be carried out with the permission of local authorities and in consultation with community members. It is always necessary to recognize the validity of local systems of knowledge, and the rights of communities to make their own decisions regarding the use of their resources.

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Chapter 6. Conclusion

This thesis aimed to address three questions:

1) What is the ecological value and level of degradation of community forests, including sacred forests and community forests that are not sacred, in Kaboli Togo?

2) What factors are associated with successful or unsuccessful protection of intact ecosystem within Kaboli's community forests? and

3) What are potential future strategies for the conservation of community forests and sacred forests in Kaboli and other culturally or ecologically similar communities?

We were able to address each of these questions, finding that sacred forests were less degraded than otherwise similar non-sacred community forests, potentially due to the uniqueness of cultural and spiritual resources provided by sacred forests and the fact that forest gods are able to more effectively enforce regulations or taboos than community members or state foresters. These results suggest that conservation of cultural practices should be a focus for those whose goal is to conserve the ecosystems found within sacred forests. As far as we know, this is the first study conducted in West Africa to use an interdisciplinary approach in order to compare sacred forests and other non-sacred community forests.

6.1 Key Findings

The two sacred forests considered in this study were significantly less degraded and had a higher ecological value than an otherwise similar community forests that did not contain a sacred site. Sacred forests had a higher percentage of tree cover within historic forest boundaries, vegetation communities that more closely matched those of endangered dry forest ecosystems, significantly greater levels of biodiversity, and the capacity to store more biomass than the control forest that did not contain a sacred site. While we cannot make a general statement about the effectiveness of conservation of sacred forests compared to non-sacred forests based on this case study, these results certainly suggest that this relationship should be further investigated.

This case study has identified threats posed to communally managed forests in Kaboli, Togo and suggested factors that contribute to communities' ability to manage these threats. Residents of Kaboli have identified rapid population growth, overly restrictive governmental

policies that fail to consider the needs of local people, lack of economic assets, local land use conflicts, and westernization as factors contributing to the degradation of the town's community forests. Communities who identified more social and cultural uses and values of community forests during focus group interviews were more successful in conserving their forests, regardless of consumptive or ecosystem service values of these forests. Possible explanations for the greater conservation success of sacred forests over other non-sacred community forests in Kaboli include the uniqueness of spiritual and cultural resources provided by sacred forests and the forest gods' abilities to enforce regulations and taboos more effectively than community members or state foresters.

Processes related to westernization were found to have particularly complex effects on the relationships between forests and people in Kaboli. Interactions between the United States and Europe during the years of the trans-Atlantic slave trade participated in the creation of sacred forests in the area, while effects of colonization and development efforts including the introduction of new agricultural techniques, the placement of the border between Togo and Benin, efforts to become a democracy, religious conversion to Christianity and Islam, and the introduction of a cash economy have contributed to a reduced respect for sacred forests and the resulting threat of degradation to these culturally and ecologically unique spaces.

6.2 Significance of the Research

Previous research has suggested that sacred forests in West Africa provide a relatively successful example of CBNRM in which forest management is controlled by respected community leaders and carried out in a culturally relevant manner (Campbell 2005; Kokou et al. 2008). Cox (2014) explain that local management systems surrounding sacred forests often demonstrate successful implementation of governmental functions such as the enforcement of sanctions, creation of resource boundaries, and provision of benefits that are necessary for the successful management of common pool resources.

Numerous studies have indicated the significant role that sacred forests can play in both the conservation of biodiversity and the maintenance of human well-being (Decher 1997; Campbell 2004, 2005; Bosart et al. 2006; Kokou & Sokpon 2006; Kokou & Kokutse 2007; Kokou et al. 2008). However, many have also noted certain ecological limitations of these systems such as the fact that sacred forests are often quite small and isolated from other patches

of high quality habitat (Bosart et al. 2006; Kokou et al. 2008). Additionally, it is clear that the role of sacred forests within social-ecological systems varies widely based on the environmental and cultural contexts in which they exist. Therefore, more case studies examining the social and ecological roles of sacred forests and considering effective practices for their successful conservation are necessary.

This study builds particularly on the work of Dr. Kouami Kokou and his colleagues at the University of Lome who have extensively surveyed the sacred forests of Togo. Their work has indicated the important role that sacred forests play in forest conservation in Togo, described the characteristics of vegetation communities found in sacred forests throughout the country, and explained the cultural and spiritual functions of these forests. They have identified current threats to the conservation of sacred forests and argued for the creation of a national sustainable forest management framework that would address these threats. My thesis adds to this work by focusing in more depth on a few sacred forests located in one part of the country and suggests additional strategies for the conservation of these ecosystems.

This thesis has provided a multi-disciplinary case study focusing on the role of community forests, and particularly sacred forests, in the preservation of remnant dry forest ecosystems, and the construction of cultural identity in Kaboli, Togo. Results of this study align well with previous work suggesting that sacred forests in Togo represent particularly valuable ecosystems that protect endangered forest habitats, contain high levels of biodiversity, and provide human populations with access to a wide variety of natural resources (Kokou et al. 2005; Kokou & Kokutse 2007; Kokou et al. 2008). However, challenges related to forest degradation associated with the breakdown of traditional social and religious structures described in the literature (Kokou & Kokutse 2007; Kokou et al. 2008) were also observed in Kaboli. This study has provided an in-depth description of the specific challenges causing this degradation and identified certain factors contributing to the ability of communities to meet these challenges within the context of a large Yoruba-speaking town in the Guinean savannah of the Centrale region of Togo.

As far as we know, this is the first study to specifically compare sacred forests to an otherwise similar non-sacred community forest. Additionally, it is one of only a few studies to consider sacred forests in West Africa using a mixed methods approach. This ecological and social comparison of sacred and non-sacred community forests has contributed to an

understanding of the cultural factors associated with the particularly high conservation value of sacred forests and allowed us to recognize the importance of pairing ecological and cultural conservation within this system.

6.4 Limitations

It is important to note that while this study provides an in-depth consideration of the role of community forests and particularly sacred forests in Kaboli, only three sacred forests and one community forest not containing a sacred site are considered. Caution should therefore be taken in applying the results of this research to other scenarios. The function of community forests and sacred forests varies depending on the ecological and cultural contexts in which these systems exist.

A second limitation of this study occurred due to my inexperience in the identification of the tree species of Togo's deciduous dry forests. While I am relatively confident in the species identifications that were made, approximately three percent of individual trees in the Legu Forest, eighteen percent of individual trees in the Sabi Forest, and 29 percent of individual trees in the Kala Forest, were unidentified. This limitation is unlikely to have significantly affected the accuracy of biodiversity and biomass calculations because when measuring biodiversity, unknown species were provided with a unique identifier and included in calculations. When calculating biomass, site averages were used as wood density values for unknown species (Sidzamba et al. 2016). However, large numbers of unidentified trees did prevent us from being able to provide a detailed description of the vegetation composition of our study sites. Instead, we gained a basic understanding of forest type by identifying the three most dominant species at each site.

6.3 Management Implications

Results of this study indicate that community forests with important social, cultural, or religious roles are more effectively conserved than those that are used primarily for agriculture, forest products, or ecosystem services (such as increasing rainfall and providing wind breaks) by community members. Considering that cultural and religious factors play such an important role in community forest conservation, we suggest that efforts to conserve traditional cultural and religious systems should be included in projects or initiatives aiming to conserve forests in Togo.

Previous literature addressing the deforestation of sacred forests in West Africa has suggested that efforts should be taken to replace degrading traditional management systems based on taboos and local religion with alternative management structures such as state regulations or incorporation of sacred forests into national systems of protected areas (Decher 1997; Dudley et al. 2009). For example, Kokou et al. (2008) suggest the need for the development of a national sustainable forest management framework in Togo. The Sabi family in Kaboli came to a similar conclusion; they recognized that the traditional gods of their forest were no longer capable of adequately protecting it from unsustainable use and therefore decided to collaborate with the state to officially register their community forest and gain additional protection.

Efforts such as these are clearly necessary for the conservation of these endangered ecosystems in today's rapidly changing world. However, we suggest that in addition to developing alternatives to traditional management systems, forest conservation efforts should also focus on strengthening these traditional management systems. Several studies have indicated that sacred forests are often more effectively conserved than national protected areas, suggesting that traditional systems based on taboos may be more effective than state management systems (Kokou et al. 2008). These traditional systems have been tested and perfected over generations while state management systems are much newer and still in the process of developing best practices and effective enforcement. Unfortunately, struggling communities such as Sabi hoping to address problems caused by disappearing taboos through the adoption of state management systems may find this approach on its own will not solve their problems. Therefore, we suggest a two-pronged approach including both the development of appropriate sustainable forest management practices on a national level and the preservation of local traditional forest management practices.

Efforts taken by the state, non-governmental organizations (NGO's), village development committees, or other development actors to preserve traditional forest management practices based on local religious systems and taboos could begin with the incorporation of traditional knowledge into development efforts. For example, in Kaboli, several projects focusing on reforestation have been implemented over the past several years by actors including local NGO's, the village development committee, and Peace Corps volunteers. These projects nearly always include capacity-building workshops, and the state forester located in Kaboli is often

invited as a guest speaker. Experts in traditional forest management practices such as elders or forest priests could also be invited to participate in these events.

Traditional knowledge could also be incorporated into public education. Barnhardt & Kawagley (2004) have developed a framework for the incorporation of traditional knowledge into western public education systems in Alaska that could potentially be adapted to the context of Togo. Actions such as these could help to validate traditional knowledge and demonstrate to community members, and particularly young people, that traditional knowledge is respected by state and development actors; it is not only a system of the past but can play a role in informing a healthy and prosperous future. Considering the important role that traditional systems play in the conservation of sacred forests and other community forests, efforts such as these to respect and conserve traditional knowledge could have a significant positive impact on forest conservation in Togo.

6.5 Future Research

The town of Kaboli presents a particularly interesting setting for the study of sacred forests. While this thesis considered only four of the town's community forests, each of the town's thirteen quartiers own one or more community forests. As these forests are located within 25 kilometers of each other in very similar climatic conditions, and the quartiers of Kaboli are culturally quite similar to each other, the town provides an opportunity for comparison with relatively few changing variables. This allows for a clearer understanding of the mechanisms behind varying levels of degradation within community forests. Additionally, the Abdulai state forest is located within thirty kilometers of Kaboli. Future studies could compare vegetation communities within Kaboli's sacred forests, community forests not containing sacred sites, and the Abdulai State Forest.

Another interesting follow-up study to this research could consider the Sabi and Kala Forests. At the time of this study these two forests were quite similar ecologically and played a very similar social and cultural role within the community. However, while the Kala quartier was highly distrustful of state agencies and did not collaborate with them in any way, the Sabi quartier is currently in the process of building connections with the state forestry service and registering their forest as an official community forest with the state. It would be interesting to

conduct a follow-up study after several years to compare the success of these two communities' differing conservation strategies.

While this case study considers the social and ecological role of community forests and particularly sacred forests in Kaboli, Togo, the social-ecological systems in which these forests exist vary greatly throughout the country and the region. We have only begun to understand the complex roles that these forests play globally. Therefore, similar case studies are needed focusing on the conservation of sacred forests existing in various social-ecological systems around the world.

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Appendix: Interview Guide

1. What is the history of the forest? / Qu'est-ce que l'histoire du foret?

2. What is the forest like (ecologically)? What was it like in the past? / Comment est le foret maintenant? Comment le foret a été au par avant?

3. How is the forest used by members of the quartier and the village? What do people do in the forest? How was the forest used in the past? / Comment les gens du quartier et du village utilisent le foret? Qu'est-ce que les gens fassent dans le foret? Comment les gens ont utilisé le foret au par avant ?

4. Particularly, how is the forest used for religious purposes? How was it used for religious purposes in the past? Is there a sacred site in this forest? Can you tell me about that site? What role do sacred sites play in the conservation of the forest? / Particulièrement, comment est le foret utilisé pour la religion? Comment le foret a été utilisé pour la religion au par avant ? Il y a un site sacré dans le foret ? Est-ce que vous pouvez me parler un peut de ce site? Le site sacré a quel rôle dans la conservation du foret ?

5. What are the threats to the forest? Why has the forest been destroyed? / Quelles sont les menaces au foret ? Pourquoi le foret a été détruit ?

6. How is the forest organized? Who owns the forest? Who has access to the forest? Who makes decisions regarding the forest? Was this system different in the past than it is now? / Comment le foret est organisé? Le foret c'est pour qui? Qui peut utiliser le foret? Qui fait les décisions regardant le foret? Est-ce que ce système est différent maintenant que comment il a été au par avant?

7. How is the forest managed? What regulations exist? Who is in charge of them? How are regulations enforced? Is management different in the past than it is now? / Comment on gère le foret? Il y a les régulations (les ordres) pour le foret? Qui est chargé pour la foret ? Comment on fait que les gens respectent (suivre) les régulations ? Est-ce que ce système est différent maintenant que comment il a été au par avant?

8. What do you think will happen to the forest in the future? / Qu'est-ce que vous pensez vas passer au foret dans l'avenir?

9. What is your opinion about the importance or utility of the forest? Do you think that its conservation is important, or would it be better to put the land to another use? / Qu'est-ce que votre opinion sur l'importance ou bien l'utilité du foret? Est-ce que vous pensez que la conservation du foret est important, ou il sera meilleur de couper les arbres et utiliser la terre pour autres choses ?

10. In your opinion, what can be done to help ensure conservation of your community forest in the future? / En votre opinion, qu'-est-ce que on peut faire pour conserver le foret dans l'avenir?

11. Is there anything else you would like to add? Is there anything else important that I should know? / Il y a autres choses que vous voulez ajouter? Est-ce que il y a autres choses important que je dois savoir?